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ILLUMINATING ENGINEERING

OCTOBER 1969

Journal of the
ILLUMINATING ENGINEERING SOCIETY

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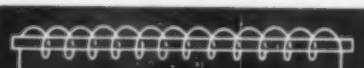

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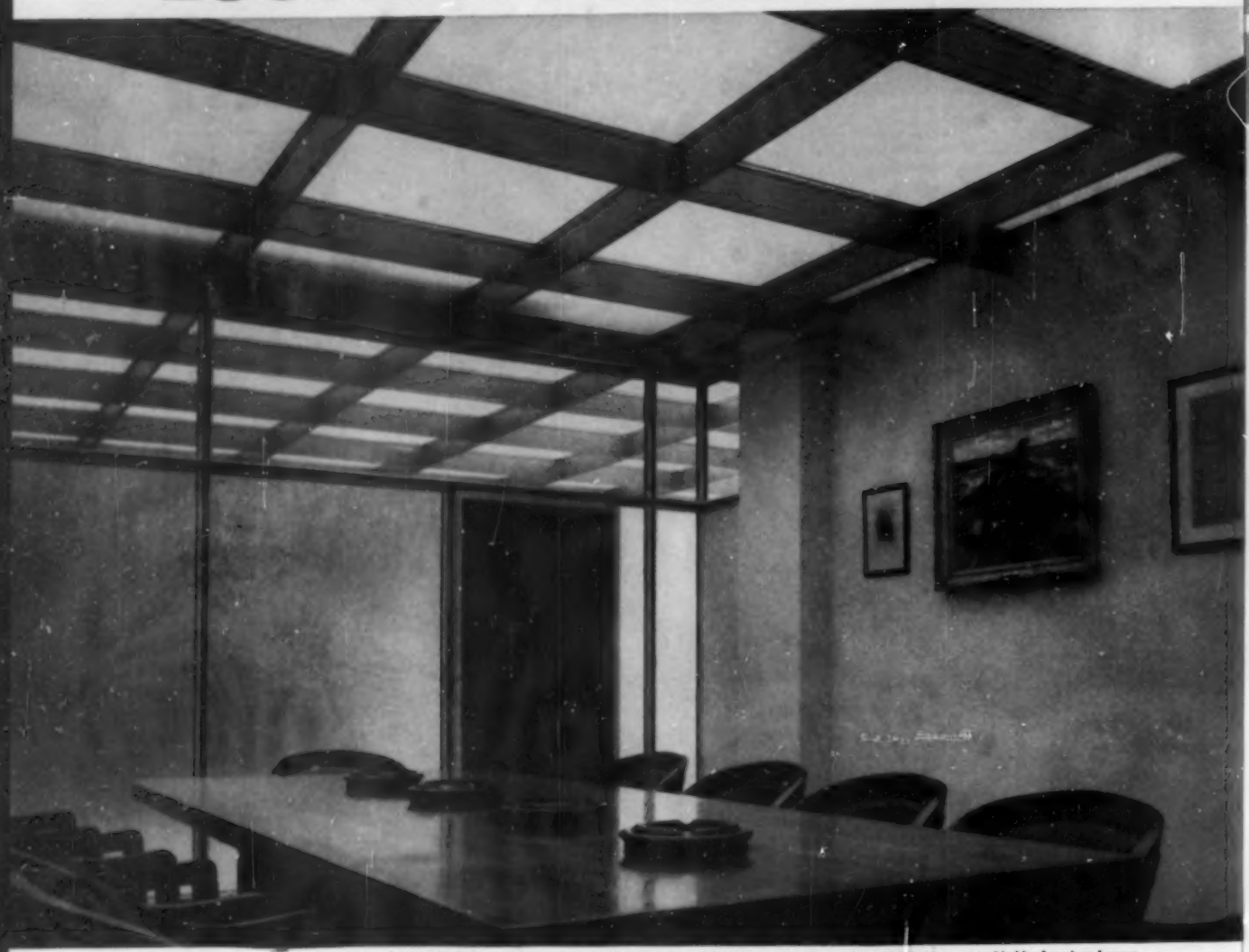

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THE JOURNAL OF THE ILLUMINATING ENGINEERING SOCIETY

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More than 1800 fluorescent fixtures in Old American's new building help create this striking nighttime impression.

Architects: Voscamp and Slezak
Mechanical Engineers: Scott and Kinney

110 footcandles of glare-free illumination are maintained throughout, including this attractive lounge for employes.

How Old American Insurance Co. ended the great lighting search with Day-Brite

True to Missouri tradition, Old American Insurance Co. adopted a "Show Me" attitude when considering lighting for their new Kansas City headquarters.

Working closely with their architect and consulting engineer, they contacted their local power and light company engineers. Consulted the experts at General Electric's famed Nela Park. Even made their Addressograph Department a "lighting laboratory" and installed competitive fixtures side-by-side.

Result? For lighting effectiveness with high visual comfort, over-all economy with trouble-free maintenance, and pleasing appearance, Day-Brite lighting was the clear-cut choice.

May we show *you?* Call your Day-Brite representative, listed in the Yellow Pages, for the FACTS and FIXTURES! *Day-Brite Lighting, Inc., St. Louis, Mo. and Santa Clara, Calif. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ont.*

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Modular design, incorporating Day-Brite Mobilex® with Cleartex® enclosures, permits complete flexibility in arranging offices and work areas.

LITECONTROL LIGHTING Helps Ivy League Look Better

..."Before and After" Pictures Prove It

You're looking at two photos of the Men's Clothing Dept., Harvard "Coop" . . . and you don't need a liberal education to note the superiority of the lighting in the right hand picture! New Litecontrol fixtures provide an average intensity of 70-75 footcandles as against an approximate 35 footcandles for the previous equipment.

What's more, we measured the footcandles right at the *point of sale* — (the price tags on the sleeves of the suits in the racks along the sides). At the very important lower level, the reading was 57 footcandles (upper level 98 footcandles).

We think you'll also agree the room is now more pleasant for an undergraduate (or anyone else) to buy a suit. Fixtures have the modern shallow look . . . blend well into the ceiling construction . . . the STYLUX plastic diffuser distributes light functionally and cheerfully. The polystyrene prismatic panels are light stable, conform to IES-NEMA-SPI specification for Class C (ultraviolet light stabilized) styrene. Think of Litecontrol for *your* next commercial job.

INSTALLATION:
Harvard Co-Operative Society, Harvard Square, Cambridge, Mass.
AREA SHOWN:
Men's Clothing Department.
LIGHTING DESIGN:
Lighting Division, Cambridge Electric Light Co., Cambridge, Mass.
DISTRIBUTOR:
Westinghouse Electric Supply Company, Boston, Massachusetts.
ELECTRICAL CONTRACTOR:
M. B. Foster Electric Company, Boston, Massachusetts.
CEILING HEIGHT:
10' — 0".
FIXTURES:
Litecontrol #4284RS-X 8 lamp 4 ft. square surface mounted fixtures, with STYLUX clear patterned polystyrene diffuser. Lamps, 40 watt Deluxe Cool White Rapid Start. Strip fixtures in suit rack cornice by others.
INTENSITY:
Average in area, 70-75 footcandles in service. At price tags on sleeves of suits in lower rack, 57 footcandles.

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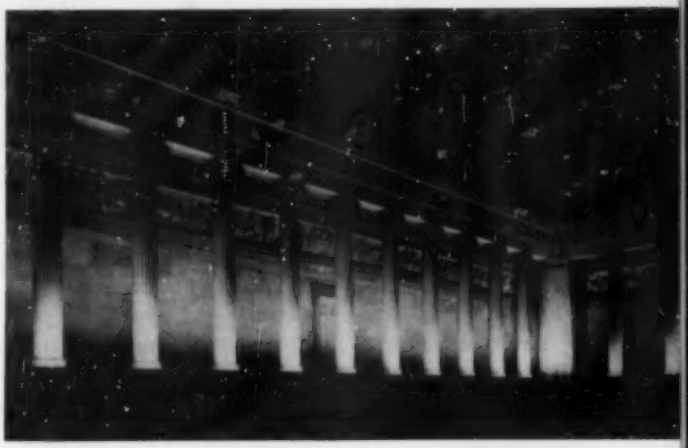
DESIGNERS, ENGINEERS AND MANUFACTURERS OF FLUORESCENT LIGHTING EQUIPMENT DISTRIBUTED ONLY THROUGH ACCREDITED WHOLESALERS

ARCHITECTURAL FLOODLIGHTING

For An American Landmark

As an expression of art, floodlighting of beautiful architecture is a growing field. Application details reveal it as an expression of science too, one of the most interesting of illuminating engineering problems.



Engineering success of this floodlighting can be measured by the uniformity of light distribution on the columns and statues from the totally concealed fluorescent equipment; artistic success by the beauty of the columns standing out in relief against the back wall.

ARTISTICALLY, the problem in floodlighting the Museum of Science and Industry in Chicago was one of integrating the lighting equipment with the structure's beautiful design. Technically, the problem also involved the design of floodlighting fixtures compatible with the artistic aim, and their inconspicuous application.

Engineering plans were developed for four different lighting techniques. Artistic judgment of the effects produced by each of these systems was obtained from experts in that field—the Directors of the Museum. Each system was first engineered and a trial installation made on the building itself, for study of the effects.

First try was a system of PAR spotlights behind the vertical columns. This produced a very striking effect of light beams on the wall, but the uneven appearance of the lighting effect was not acceptable. The second method again floodlighted the wall back of the columns, this time using incandescent floodlights which were mounted on flat bases behind the columns. These units developed a very

Lighting equipment has been so inconspicuously blended with the building architecture that in the daytime it can scarcely be noticed. Floodlighting fixture is an eight-foot aluminum reflector housing with a 1500-ma lamp.

high ratio between lower and upper wall sections.

An effect which greatly pleased the Museum Directors was from a system using concealed heavy-duty cast floodlights 60 to 70 feet away from the building. With a combination of various beam spreads, this produced an interesting effect on the entire facade and brought out details of the cornice, Ionic columns and entrances. Artistically, this was the solution. Its application, however, involved pits for concealment of equipment, grates for public protection and, finally, a change in ground elevation so that the front of the pit would not block off light directed at the building. Costs dictated a less complicated design.

Solution

Final installation is a tribute to the expression of lighting as an architectural element and to the engineering aspects of this element. The system uses 472 feet of fluorescent strip luminaires mounted on a continuous horizontal channel, for the entire face of the building, at the base of the columns. Basically, the luminaire is an eight-foot aluminum reflector housing and a 1500-ma lamp. Mounting to the continuous channel is with aluminum conduit to avoid weather stain on the building face. Ballasts are located in the channel as part of the installation. The channel also acts as a wire raceway and is covered with a completely gasketed one-piece steel cover. The fixture is entirely waterproof in an upward position, and to eliminate water seepage, small weepholes were drilled in the lower side of the reflector to provide drainage for condensation.

In daytime, the system is completely inconspicuous. Indeed, so perfectly does it blend into the architectural structure that it can scarcely be detected. The nighttime effect is quite different from that obtained in more conventional lighting designs. From the engineering point of view, uniformity of suitable brightness has been obtained throughout. Readings show 6.70 footlamberts at the base of the columns, gradually tapering off at the top. The angular position of the reflectors provides good intensities at the top of the columns also, revealing the graceful details of this part of the architecture. Most important, however, the vertical wall behind the columns has four times as much light as the columns themselves, making an especially attractive nighttime effect of the columns standing out in relief.

A still different effect defines the entrance at the center of the building. Here the same fixture is mounted vertically behind four taller entrance columns and throws these columns into total silhouette as compared with the other lighted columns. At the same time, higher brightness focuses attention on the entranceway.

For the dome, it was important that the lighting be compatible with the relatively high brightness of the fluorescent lighting on the columns. To provide a similar brightness quality on the dome, 700-watt mercury lamps were used in a standard floodlighting design.

Engineering and lighting design for this installation was by Burton Benjamin of Revere Electric Manufacturing Co. and Wallen S. Arbetter of Summit Electric Co., both of Chicago. The installation won first prize in both the Chicago Section and Midwestern Region Applied Lighting Competitions and was presented at the national competition in Pittsburgh last September.

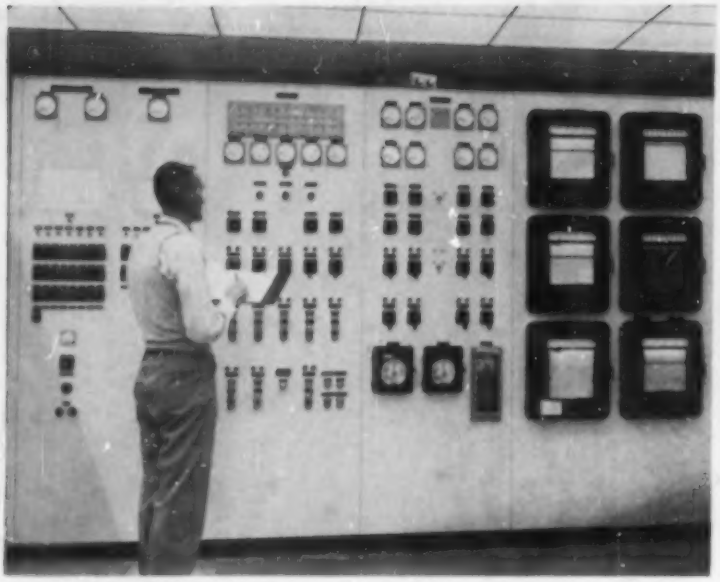
Power Dam Control Room

Low brightness luminous ceiling is combined with tilted directional troffers in a high quality installation for the control room of the mammoth generating station which harnesses the power of the St. Lawrence River.

The Robert Moses Power Dam which spans the St. Lawrence River between the United States and Canada at Massena, New York, is the first generating station built by the Power Authority of the State of New York. This huge station, named for Robert Moses, Chairman of the Power Authority, is second in size only to the Grand Coulee Dam on the Columbia River.

Control room of the generating station, containing most of the instruments, relays, meters and control switches required for operation of the station, is the nerve center of activity and, as such, required a well-planned illumination system for accurate work operation. The critical area in control room lighting design is, of course, evenly distributed vertical illumination on the control boards. In this particular installation, since the control room is a showplace for the millions of tourists expected to visit the plant each year, the lighting design also had to fulfill certain esthetic standards.

A combination of diffuse and directional illumination is used in the design—low brightness molded acrylic lens luminous ceiling for diffuse illumination on the horizontal plane; troffer units with asymmetric lenses, following the contour of the control board, for directional illumination on the meters. To blend these two systems into one pleasing design, the luminous ceiling was constructed in three sections with the middle portion dropped to establish two levels and break the monotony of the large luminous area. The lower-level center section is 11 feet 3 inches above the floor and the two upper-level outside sections 11 feet 9 inches above the floor. Housed in the transitional area between upper and lower ceiling levels are the tilted directional troffers which provide uniform light distribution across the vertical surface of the control boards. In addition, ventilating and air



Shadowless, uniform light distribution is obtained on the vertical surface of the control boards from two-lamp directional troffers tilted about 20 degrees from the horizontal.

conditioning outlets were conveniently located in the transitional area.

The luminous ceiling is 80 feet long and 46 feet 3 inches wide with a 15-inch plenum. Molded acrylic lens diffusing material is supported on extruded "T" frames spaced on two-foot centers along the width of the room, with adjustable hanger rods supporting the "T" frames and leveling the ceiling. Warm white rapid-start fluorescent lamps are mounted in 25 rows of 22 luminaires per row, 11 inches above the acrylic lenses. Enclosing the light cavity are white reflector ceiling boards, installed above the lamps.

Maintained horizontal illumination level from this system was measured at 153 footcandles at a point 30 inches above the floor on an operator's desk and on the sloped portion of the benchboard. Variations from two to 153 footcandles are possible with the use of a stepless autotransformer type dimmer, but it has been found that workers prefer to have the installation at full output during the hours of peak activity and approximately one-quarter dimmed when activity is at a minimum.

Ceiling brightness is comfortably low, especially at critical viewing angles. Measurements across the axis of the ceiling were: 150 fL at 15 degrees from the horizontal, 175 fL at 30 degrees, 200 fL at 45 degrees and 225 fL at 90 degrees.

The critical vertical illumination on the meter boards was measured at 75 footcandles, in service, from directional troffers tilted approximately 20 degrees from the horizontal, the center line located about 2 feet 9 inches from the face of the boards. Troffers are equipped with two rapid-start warm white fluorescent lamps and use asymmetric lenses.

Emergency lighting system is composed of four 100-watt incandescent lamps mounted in the plenum of the luminous ceiling to supply illumination on the relay board and sixteen 60-watt incandescent lamps in the board lighting troffers for the station service board and control benchboard. The luminaires are automatically switched to direct current in the event of the failure of the normal alternating-current system.

Maintenance costs have been reduced by the installation of electrostatic precipitators which filter the air above and below the luminous ceiling, help to keep ballast temperatures low and minimize dust accumulation. Light-colored surfaces throughout the area contribute to the general quality of the installation. Reflectances are: walls, 50 per cent; floor, 40 per cent; ceiling, 80 per cent.

Prior to 1950, most control room lighting designs were of three general types: asymmmetrical arched ceiling with indirect cove lights over operator's desk, flat ceiling with indirect lighting intensifying the center portion of the ceiling and flat ceiling with direct troffer lighting. Luminous ceilings were often rejected because of ceiling brightness and high maintenance costs. Today, however, progress in light control has made installations such as the one described here both practical and desirable.

Robert Chin, Chas. T. Main, Inc., Boston, Mass., designed this installation which won first prize in the New England Section and Northeastern Regional Applied Lighting Competitions and was entered in the national competition.

INSTALLATION AT CAROLINA POWER & LIGHT CO., CLINTON, N. C.

Lighting a Showroom-Collection Office

LIGHTING OBJECTIVE: To provide general illumination for the display of electric appliances and for bill collecting.

GENERAL INFORMATION: This combination collection-display area measures 24 feet by 25 feet with a 10-foot ceiling height. The glass front and side portions, in effect, make this area into a large show window for attraction purposes. Colors and reflectances of the major room surfaces are:

ceiling	white	75%	walls		
floor	terrazzo	35%	plaster	green	50%
furniture	wood	50%	paneled	wood	50%

INSTALLATION: After 500 hours of operation, the illumination level at the collection counter was 175 footcandles. At the display area the level was 200 footcandles. These levels are provided by seven Day-Brite Lighting Inc. catalog No. 48F880 four-foot square recessed units and by two Day-Brite Lighting Inc. catalog No. 4F480-12 two-foot-wide, twelve-foot-long troffer runs. Each of the four-foot-square units are equipped with Holophane 6024-DB Controlens and eight 40-watt T-12 warm white rapid-start fluorescent lamps. Each of the twelve-foot-long, two-foot-wide runs are also equipped with Holophane 6024-DB Controlens and with twelve 40-watt T-12 warm white rapid-start fluorescent lamps.

The four-foot-square units are on eight-foot centers and the two 12-foot runs on 16-foot centers in the interesting arrangement shown in the above photograph.

Brightness readings after 500 hours of operation were:

ceiling	23 fL	luminaire at 60 degrees	600 fL
walls, plaster	43 fL	floor	28 fL
paneled	40 fL	furniture, side	18 fL

Lighting designed by Junius A. Morgan, Carolina Power & Light Co., Dunn, N. C.

Lighting data submitted by W. P. McPherson, Carolina Light & Power Co., Raleigh, N. C., as an illustration of good lighting practice and to aid in the design of similar installations.

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A.I.A. File No. 31 f

At Salt Lake City's First Federal Savings and Loan, entrance below stone grillework of remodeled facade is emphasized by 100 footcandles of light from eight warm white slimline fluorescent lamps mounted on five-inch centers above translucent glass ceiling. Since ceiling slopes from front to back, there is enough spill light to dramatize the glass panel sign.

Glamor Comes

WHETHER concern for a corporate image, tax benefits or a burgeoning esthetic interest has been the motivating force, one of the most pleasant facts of banking in recent years has been the addition of beautiful buildings to our city skylines. In almost every major city, bankers have taken the lead in reclaiming downtown areas. Often the bank buildings are exciting new skyscrapers with floors of office space in addition to the banking quarters, or, equally welcome, face-lifting projects, inside and out, which infuse new vigor into familiar surroundings.

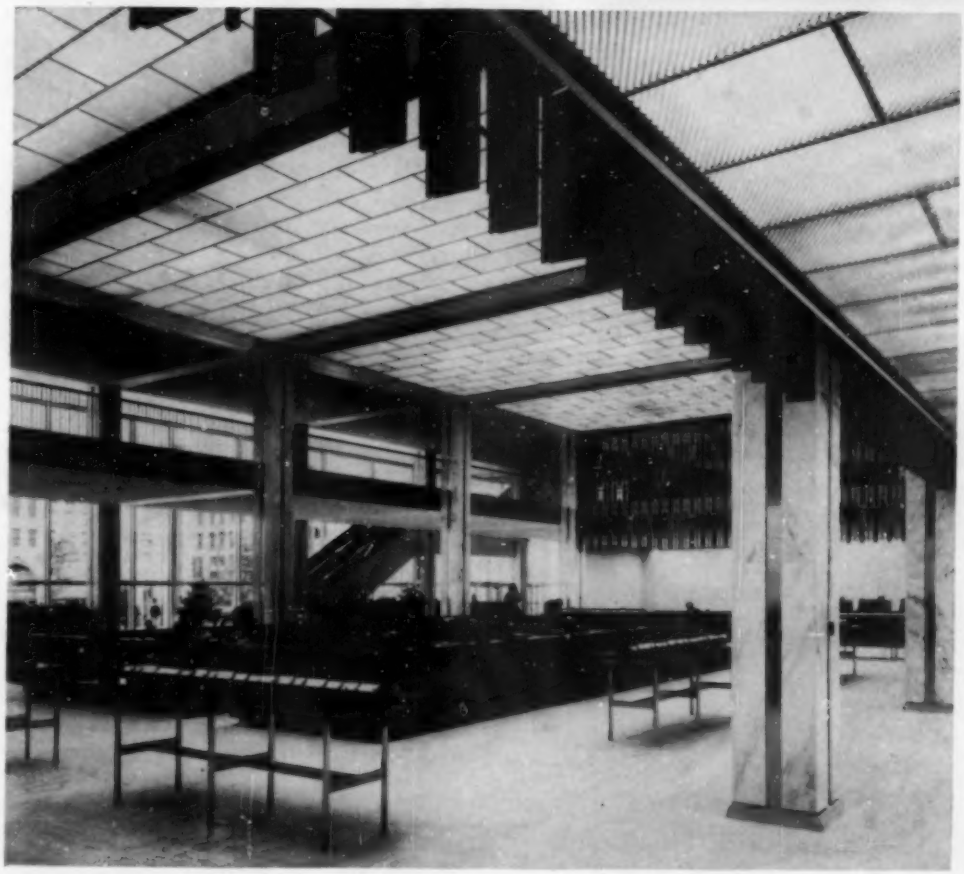
The two banks shown on this and the following three pages illustrate the two kinds of redevelopment. New home of National Bank of Detroit is the first major office building constructed in downtown Detroit in 25 years, a 16-story structure with 600,000 square feet of office space. This building has received much praise in the architectural press and its lighting, particularly the dominant gold anodized luminous ceiling (see facing page) contributes immeasurably to the final architectural effect.

Somewhat less spectacular but nonetheless a boon to downtown Salt Lake City was the remodeling of one of the city's landmarks, The First Federal Savings and Loan Association. This building, which dates originally from 1890, has been given a new facade (see above) and its floor space expanded to 11,012 square feet, more than three times that of the old landmark. Lighting here is no small part of the modern look. Surmounting the inevitable structural complications involved in remodeled buildings, the lighting engineer has designed a system which does not burden the architectural effect and produces upwards of 100 footcandles in all areas of the bank.

Lester J. Severs, Albert Kahn Associated Architects and Engineers, Detroit, designed the lighting for the National Bank of Detroit which won first prize in the Michigan Section's ALC. Consulting engineer Vernon Proctor won first prize in the Utah Section, second in the Intermountain Region, for design of the First Federal Savings and Loan installation.

One lighting system adaptable to both a 26-foot-high lobby and a 12-foot-high teller area at the National Bank of Detroit is the beautiful gold anodized luminous ceiling (photo below), good lighting with obvious decorative attributes. Constructed in four floating sections, each 22 by 45 feet, the system provides 100 footcandles at the tellers' counters, 60 footcandles in the high-ceilinged lobby. Continuous rows of four-foot cool white rapid-start lamps are used—164 lamps to each section—with air diffusers and exhaust registers installed between the rows of lamps. Gold anodized hexagonal cell louver material which blends with the warm tones of the decorative scheme is framed with aluminum channel into 2½- by 5-foot panels. The louvers have 71 per cent RF and provide 57-degree cut-off. Maximum brightness at 45 degrees to the light source is 100 fL. In background, note 150-watt PAR38 floods in baffled downlights which light the two-story exterior arcade without competing with the luminous ceiling.

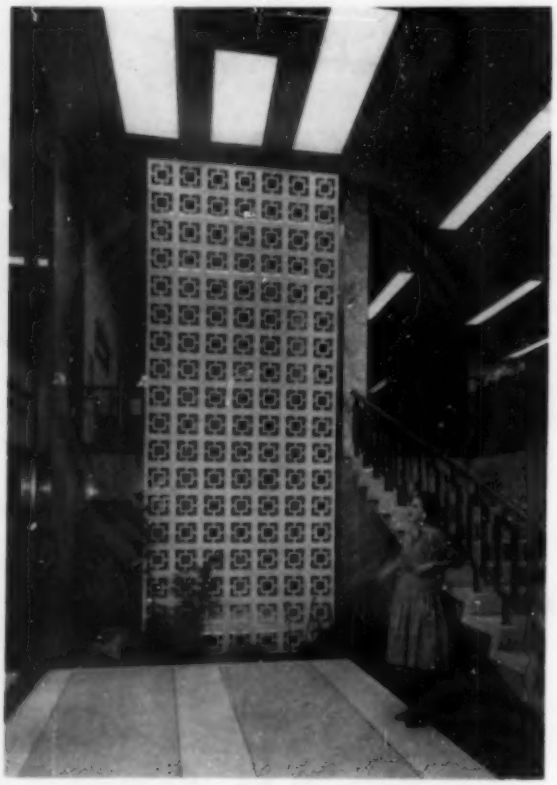
To Banking



First Federal Savings and Loan Association
Salt Lake City, Utah

High ceiling and tellers' stations set at an angle to wall were structural complications in main banking area (left). Two- by four-foot units with four warm white 40-watt rapid-start lamps and low brightness lenses are recessed over counters so that light strikes counters and is reflected away from tellers' eyes, reducing glare. On wall behind tellers, saw-toothed at same angle as counters, two-lamp fluorescent strip installed behind furring accents the breaks in the wall. In public area, four-foot-square fixtures with six 40-watt lamps are installed at the same angle as the units over the tellers' stations. Measured illumination levels were 120 footcandles on tellers' counters, 100 footcandles in the customer area.

High-level lighting (100 footcandles) from eight two-by four-foot recessed low brightness units heightens dramatic effect of stairway and stone screen, dominant architectural elements of interior lobby (below). Pool and rock garden beneath stairway are marked for attention by continuous two-lamp strip of warm white fluorescent tubes mounted beneath stairs, next to back wall.



In second floor office area (above) one of the problems of remodeled buildings—the need to use existing equipment—has been transformed into 80-85 footcandles on desks. Originally at two levels, ceiling was furred down to lower level and new fixtures, similar in design to existing units, arranged to produce comfortable lighting levels in all working areas. Light-colored surfaces, minimizing brightness differences, add further comfort.

Low ceiling, partitions remaining from the old building and other structural restrictions prevented use of recessed equipment in bookkeeping offices (left). An average of 150 footcandles on desks, more on office machines was obtained from thin, surface-mounted units with plastic sides and low brightness lens. In mail area, at right in photo, there are 200 footcandles on the files.

National Bank of Detroit
Detroit, Michigan

Dominant lighting motif (gold anodized luminous ceiling) is repeated in second floor work area. Here ceiling is in 20- by 20-foot sections; louver panels in 1¼- by 1¼-inch cells providing 45-degree cut-off. Alternate circuiting of lamps allows a choice of 50 or 100 footcandles. Brightness at 45 degrees to louver is 140 fL; on desk, 60 fL; on grey rug, 14 fL. Three-lamp air diffusing troffers installed around perimeter of ceiling and in corridors outside executive offices keep lighting levels within 3:1 ratio between work and traffic areas.

Low brightnesses on surroundings and sufficient illumination for reading are combined with attractive furnishings in the employees' lounge (at right). Three-lamp air-diffusing troffers with cool white lamps provide a lighting level of 50 footcandles. The three-lamp air diffusing troffers are also used to supply general illumination on six floors of bookkeeping, accounting and clerical offices (not shown). Selected because they permit an increase in lighting levels within the five-foot modular pattern of the building, the troffers, with two lamps operating at present, provide 115 footcandles in work areas. Ballasts and lampholders have been installed, wired and circuited for the third lamp and an increase to 150 footcandles at a future date. Units are equipped with opal-tinted, low brightness crystal lenses to keep brightnesses within a comfortable range—650 fL at 45 degrees to the source. All fluorescent circuits are 277-volt, resulting in an estimated saving of $65,000.

To avoid the illusion of a flat ceiling sagging in the middle in this almost square meeting room with its comparatively low ceiling (left), the *luminous* ceiling has been made one foot higher in the center of the room. Alternate rows of lamps are circuited together and contactor switched to produce 50 or 100 footcandles. A separate circuit controls lighting over the speaker's platform; perimeter lamps are on dimmers.

A warm inviting atmosphere to the public reception area is provided by recessed 36-inch dome reflectors with 300-watt silvered-bowl lamps and a simple but decorative lamp shield, grill and diffusing glass. Wall washing units give esthetic character to the brick surface; downlights highlight the planter.

TOWNSHIP MUNICIPAL BUILDING

As WITH many another small community throughout the country, the Township of Shaler, Pa., near Pittsburgh, has been suffering from a common post-war development — "Suburbanitis." Its population has exploded; so have its municipal services—police force, road maintenance personnel, clerical workers. The community grew right out of its little Township offices and into a modern new building which houses all departments of the local government under one roof.

Appropriately for its 1960 status, the new building is lighted, throughout, to the latest IES recommended levels for the tasks involved. Lighting in each area, furthermore, has been carefully coordinated with all the other features which contribute to recommended *quality*. An additional pleasing feature is that the lighting is simple, proportioned to merge with the space and become an integral part of it. The entrance lobby (above) and general office area (top of facing page) are typical examples of the uncluttered effect.

Lighting design by Armand Zitelli, Duquesne Light Co., Pittsburgh, won first prize in the Pittsburgh Section and East Central Region Applied Lighting Competitions and was presented at the National Technical Conference of IES.

In Council Chamber and Public Meeting Hall (left) where all public business is transacted, lighting system is continuous rows of recessed two-foot-wide troffers with decorative plastic louvers. Units in public seating area use three four-foot rapid-start cool white lamps to produce 120 fc. Over the light-colored U-shaped table, four lamps in each unit produce between 140 and 150 fc. Carefully planned brightness ratios have kept good balance with the light-colored surfaces.

Note pleasing efficient character of clerical area. Recessed two- by four-foot four-lamp troffers with low brightness plastic lens provide uniform level of 130 fc for accurate seeing. Light-colored floor bounces light back to ceiling, minimizing brightness ratios between troffer and ceiling—an important consideration in troffer systems. Unique colored downlight over each "deal plate" contributes to general decor and adds 120 fc of functional light at this point. Clever design of this standard downlight, while actually producing "white" light, forms colored and attractive accent point in ceiling. Wall washing units along decorative brick wall have a two-fold function. From an architectural standpoint they add life, color, texture and form. Secondly, with this area in visual work field, they provide a "veil" of light to keep brightness ratios in good balance throughout the general office area.

—CIRCA 1960

In this private office (above) which has an area of 320 square feet, recessed four-foot square troffers with six lamps in each troffer have been arranged to form a rectangular pattern which completely surrounds the desk. The solid plastic bottom of the unit has a decorative "waffle" pattern. This arrangement of standard equipment using patterned plastic diffusers produces 160 footcandles and gives a "custom designed" look and an air of dignity to this executive office.

Police Information Center (below) the nerve center of the Police Department is a 120 square-foot area which has no exterior windows and is in use 24 hours a day. Good lighting was imperative and a level of 160 footcandles has been provided, with careful planning to avoid shadows, harsh contrasts and glare. Recessed troffers are equipped with four 4-foot rapid-start lamps and low brightness plastic lens. Glass in front of radio desk is a one-way mirror facing cell block so police clerk can keep prisoners under constant surveillance.

This is the last installment of a three-part report, the first two sections of which were published in the October and November issues of Illuminating Engineering.

Figure 123. Three 40-watt fluorescent tubes located across the front edge of the top shelf behind a slanted wood faceboard produce both upward and downward illumination. Twin swing-arm desk lamp, light-colored wall and desk blotter combine to create a comfortable desk area.

Lighting ... Keyed to Today's Homes

CHAPTER V

Lighted Interiors

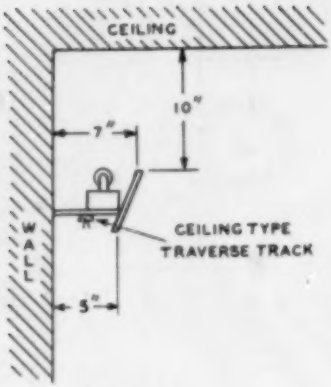
The illustrations in this chapter show large areas or entire rooms in which several of the lighting techniques described in this report are combined. It is usually essential to incorporate several types of lighting in each interior. Note that in many of the examples shown, fluorescent lighting is used to provide background or general illumination in the area while incandescent filament lighting is used at specific seeing locations and for decorative accent.

Figure 124. Light from fluorescent tubes built into the room divider base strikes the lower edge of the large plastic panels, diffusing upward through the etched designs to the edges of the panels. This technique is often referred to as "edgelighting." General illumination is provided by fluorescent cove lighting, and two downlights (not shown) highlight the table. Architects, G. Fred Keck and William Keck. Interior Designer, Marianne Willisch. Photograph by Hedrich-Blessing.

Figure 125. Double-tilted wall bracket over bed conceals one 40-watt and one 20-watt fluorescent tube; an 8-inch-wide strip of corrugated plastic is used across openings at top and bottom. Sheer white curtains reflect light into the room from the lighted cornice.

Figure 126. Shoji panels of natural wood backed by plastic form decoratively appropriate luminous ceiling section over table area in this interior of Chinese furnishings. Fluorescent tubes (40-watt) are used in the 12-inch deep, six-by-eight-foot installation. The designer wanted diffused general lighting plus an uninterrupted view of antique wallpaper panels which form wall-to-wall and floor-to-ceiling screen. Concealed from view and attached to two sides of ceiling "box" are three 150-watt projector spot bulbs; two accent panels; the third highlights gilded wooden Buddha and Japanese floral arrangement, creating both sharp and subdued shadow patterns on the blue grass cloth background. Photo by Hans Van Nes. Interior, John B. Wisner.

Figure 127. Light-colored ceiling, floor, counter tops and kitchen surfaces assist in producing effective illumination in this kitchen-family room. Luminous ceiling and under-cabinet units light the kitchen; direct-indirect light is provided at the magazine-book corner; indirect light emanates from the top of the desk center, and shielded direct light spreads over the desk surfaces; a large-scale fixture highlights the dining table.



▲ **Figure 128 (above). Four 2½-inch aperture recessed fixtures using 75-watt reflector spot bulbs light the dining table; the decorative pierced-porcelain cylinders suspended over the table use low-wattage tinted bulbs and are lined to prevent direct viewing of the light sources. Cove lighting (eight 40-watt fluorescent tubes) controlled by a dimmer and four table lamps (two not shown) complete the living room lighting. Although the cove is closer to the ceiling than is generally recommended, the high reflectance off-white ceiling, walls, carpet and draperies aid the effectiveness of the cove and other lighting techniques.**

Figure 129 (above). Eight custom-designed, low-voltage dimmer-controlled fixtures using four 20-watt reflector bulbs per unit are recessed in the ceiling in a curved pattern to illuminate davenport and table. Light-colored draperies and floor reflect light from fluorescent tubes recessed over windows as background illumination for the direct-light fixture over table. Designer, George Nelson. Lighting, Thomas Smith Kelly. Photograph by Norman F. Carver, Jr.

Figure 130 (right). A continuous line of dimmer-controlled incandescent-filament lens strip mounted at front edge of and above curved false ceiling "washes" walls, including draped window wall, with light. Illuminated false skylight creates a "sky dome" and relieves solid ceiling effect. A recessed 300-watt projector spotlight accents geraniums; an indirect floor lamp provides a pool of light between chair and davenport (metal cylinder at base houses a 150-watt projector flood bulb). Architect, Philip Johnson. Fabric Designer, Marie Nichols. Lighting Designer, Richard Kelly.

▲ Figure 131 (above). Two views show variety of effects in a five-level home. Ten 75-watt reflector downlights, recessed 18 inches out from window and four feet apart, accent draperies. Cove around dropped ceiling (14 inches below higher ceiling) conceals a continuous line of dimmer-controlled, 40-watt, rapid-start fluorescent tubes. Four 150-watt reflector flood bulbs mounted in a plastic dome four feet above ceiling line project light downward over eight-foot-diameter glass skylight. A metal fixture is centered in round glass section, and eight recessed pin-hole spotlights circle skylight over staircase. Louvered high-hat fixtures scattered in dropped ceiling accent organ and furniture groupings. Architect, Clifford N. Wright. Interior Designers, Van Riper Studios.

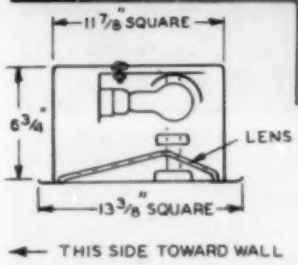
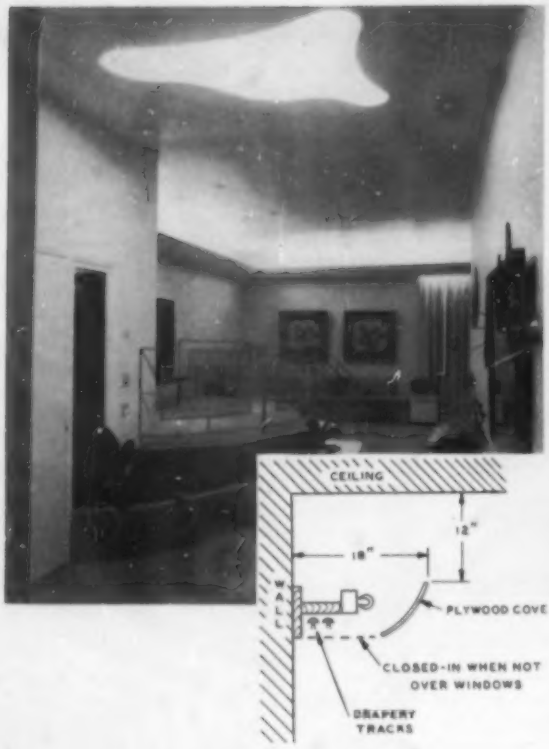


Figure 132 (above). Three recessed units, each with a 150-watt clear bulb beneath a reflector and above a concave prismatic glass lens plate, are installed 15 inches out from wall and two feet apart. For more uniform distribution of light over wall area and better coverage on end paintings, two units should be added to right and left of those shown. Photograph by Kaufman and Fabry.

Figure 133 (right). Elm wood wall and white ceiling reflect light into room from a direct-indirect valance, faceboard of which is also elm wood. Beam-suspended metal fixture is adjustable in height and may be placed in table-lamp position. Interior, Bachstein and Freitag. Photo by Ernest M. Silva, courtesy of *Living for Young Homemakers.*

Figure 134. Three custom-designed fixtures providing downward and some upward light are equipped with circular glass lens plates to provide shielding and widespread distribution. The fixtures are suspended over the tables in approximately table-lamp positions. The fireplace wall is accented by light from three 30-watt reflector spot bulbs in units recessed in the ceiling about three inches from the wall. Window wall and book wall are lighted by a continuous line of 40-watt fluorescent tubes. Interior Designer, Martin Klein.



◄ Figure 135 (left above). Dimmers and individual switch control provide flexibility in choice of effects from recessed ceiling area, recessed downlights, indirect cove lighting and direct lighting over draperies. Recessed ceiling pattern is 4½ feet across at its greatest width; three 40-watt fluorescent tubes (a gold, a blue, and a pink) are located one on each of the three sides.

▲ Figure 136 (above). A luminous ceiling, recessed downlights and large-scale lamp are combined for a variety of effects. Dimmer-controlled fluorescent tubes mounted two feet apart and located over T-bar supports provide general illumination from luminous ceiling of square plastic panels; six 30-watt reflector spots accent art wall; a 50/200/250-watt three-lite bulb in table lamp supplies flexible lighting beside davenport. Interior Designer, Martin Klein.

◄ Figure 137 (left). Light-colored curtain fabric and an incandescent-filament lens strip located between beams combine to reflect a pleasing glow into large family-terrace room. When lighted outdoor scene becomes center of interest, dimmer-controlled wall lighting can be reduced. Architect, Emil A. Schmidlin. Architectural Designer, Ellis Leigh. Lighting, Richard Kelly.

CHAPTER VI

Outdoor Living and Gardens

Across the country family fun and living areas are being extended to include the patio, the terrace, the garden and the yard. Each year more families are spending more time outdoors after sundown. This new way of American life is an economical way to increase usable areas for family living—an easy, pleasant way to entertain.

Lighting is the key to the extent of outdoor living and to the enjoyment of the beauty of the garden after dark. Outdoor lighting can increase the hours of fun and recreation in the yard and play areas, can allow extra hours for chores in the cool of the evening, can provide after-dark safety, can extend the enjoyment of the landscape and can increase the vista and feeling of spaciousness which larger glass areas and today's architectural and landscaping trends have encouraged. Outdoor lighting need not end at the close of summer; many beautiful fall and winter scenes can be enjoyed if they are lighted.

GOALS

The lighting design is developed to attain three major goals: quick, sure seeing for safe passage in the garden and in and out of the house and for discouraging trespassing; comfortable seeing to accommodate individual family activities in outdoor living and game areas; and beauty of garden and grounds. These goals cannot be attained without preplanning. The use of weatherproof wiring backed by adequate circuiting and switch control is a "must."

The ideal way to plan lighting for a garden or for outdoor living areas is to inspect the actual grounds and landscaping. If this is not possible, the wiring and a preliminary lighting plan can be

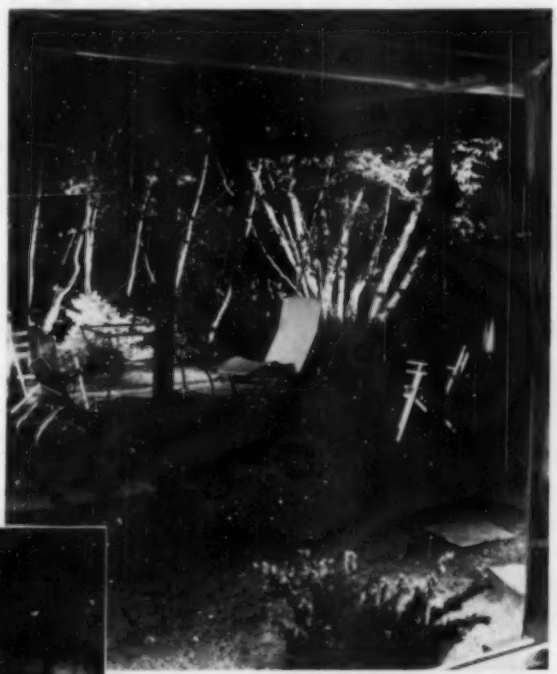


Figure 138 (left). A projector flood bulb mounted at roof line gives low-level area lighting; mushroom and small-scale fixtures accent tulips and flowering shrubbery; a projector flood bulb (burning base down) clamped to pole reflects light to table from underside of the umbrella.

Figure 139 (above). Thickly wooded area at rear of house makes it possible to floodlight birch trees from projector flood bulbs mounted on roof. Azalea blossoms beyond covered outdoor living area are highlighted by a bulb concealed in a "rock" similar to one shown in Fig. 145.

Figure 140. ***By day*** **this garden is lush and green. Although separated from the living room by sliding glass doors, it is like part of the house.** ***At night*** **the terrace is usable and the garden presents another kind of beauty. Due to the judiciously placed lights, the bold forms and colors of the plants are accented against the black of the night. Landscape Architect, Courtland Paul. Photographs are courtesy of** ***Sunset.***

drawn on the plot plan of the property. The final location of lighting equipment and an appraisal of the effects obtained can be most effectively achieved by working in the actual garden. To assist in designing light for outdoor living and for gardens, literature is available from light source and garden equipment manufacturers.

EQUIPMENT

A great variety of appropriate weatherproof

Figure 141 (left). Steps and paths in the garden and those leading from the sidewalk or driveway to an entrance require fixtures designed to shield the bulb from view and to cast a generous spread of light.

Figure 142 (above). Blending into the bed of ivy is a small verde green bud-shaped unit housing a bulb which projects a beam of light on the white figure. The mercury flood bulb at the base of the twin tree trunks creates a striking lighting effect on the trunk and through the branches to serve as a background for the brilliance of the multi-colored tulips.

Figure 143. Inconspicuous by day, "bird house" and "toadstool" become fixtures at night. From behind a tree at left (not shown) a 75-watt projector spot bulb with amber-colored cap accents figure and bird bath.

lighting units is manufactured for these applications, ranging from the functional swivel holders for spot and flood bulbs, through clever decorative garden units and hanging lanterns, to post lights. Some decorative designs masquerade as leaves, rocks, flowers, tree stumps, toadstools, or birdhouses. See Figs. 143, 144 and 145. There are even artificial lily pads which clip over a bulb and float atop the water for lighting a garden pool.

The main purpose of garden lighting fixtures is to conceal the light sources. If the light bulbs are visible, the eye is drawn to them rather than to what is to be lighted. Equipment using glass or plastic that becomes luminous must have low brightness and must be used with care.

Figure 144 (left and above). Half-cone-shaped plastic fixture is so like tree bark that during the day it is scarcely discernible. It shields a projector bulb which at night heightens the yellow of the daffodils. If desired, the position of the unit may be reversed to project light upward through the leaves and branches.

The neighbors' view must be taken into consideration, too. They should not be annoyed by glaring lights. Preferably, most equipment should not be seen. The exceptions are the decorative designs mentioned above. Heavy ground cover, shrubbery, hedges and foliage (see Fig. 146) may provide "natural" shielding, but when this is not present the equipment should be in keeping with the surroundings in color, form or concept. Sometimes equipment with bright colors may be purposely selected for gay effects.

Bulbs for outdoor use must be checked for their ability to withstand water without breakage. Bulbs of very low wattage (15 and 25 watts) and projector bulbs (PAR-38) may be used without protection, but others must be covered or enclosed. The 100-watt mercury PAR-38 bulb is usually protected by a glass cover; a cover is essential to prevent breakage when moisture hits the hot glass when this mercury bulb is used in a base-down position.

USE OF COLORED LIGHT

Fascinating effects can be achieved with colored light, obtained by the use of colored glass placed over white bulbs, or by colored bulbs and fluorescent tubes. Highly saturated colors tend to produce a grotesque rather than an artistic effect on flowers. They can be used to create a party atmosphere, or for lighting fences, walls or a unique garden ornament. Pastel tints of light are preferred. Light from mercury bulbs, a blue-green white, is especially attractive on greens and yellow,

Figure 145 (above). Shadow, form and color are created by light from a bulb hidden in "rock" (foreground). Photo courtesy of *Sunset*.

Figure 146 (right above). Redwood fence becomes a focal point when lighted by a row of fluorescent garden fixtures placed on ground and concealed by shrubbery. Light sources in this location create a glow against which shrubbery is silhouetted. Mushroom-type unit in foreground provides added accent and detail.

Figure 147. (right below). Even the smallest pool can reflect a colorful and interesting lighted scene. Sculptured figure, lighted by a 40-watt bulb trenched close beside it, is the focal point of the composition which, along with background of lighted trees and shrubbery, is clearly reflected in the water.

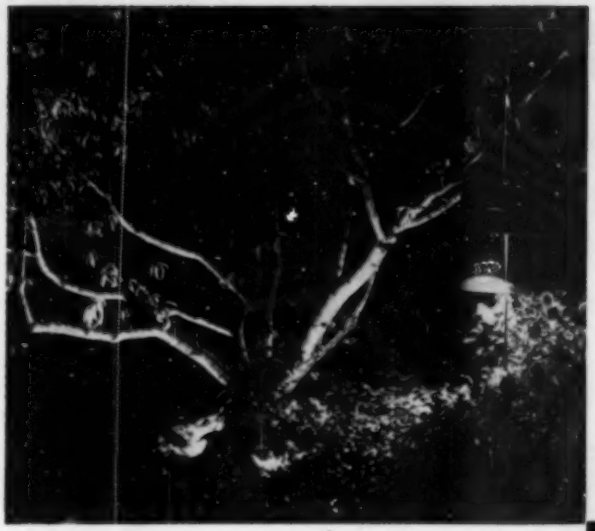


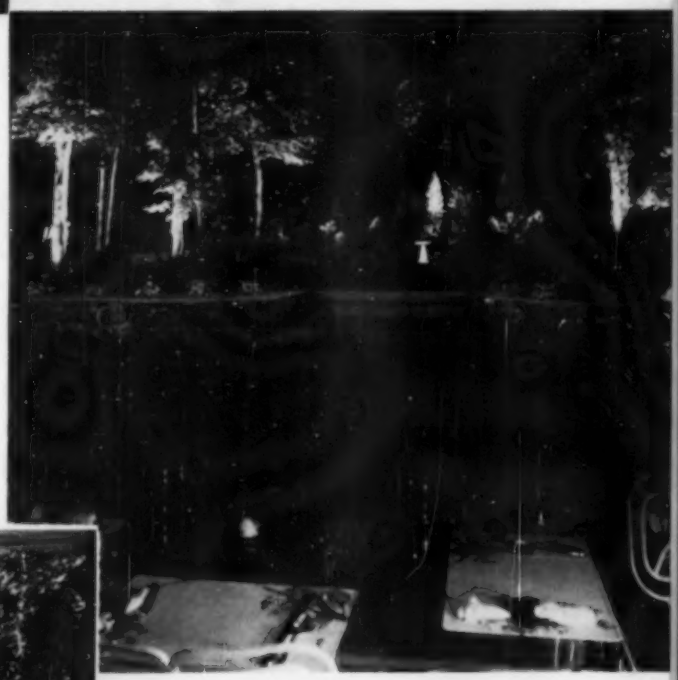
Figure 148 (left). The striking form and bark texture of this peach tree are emphasized by two 75-watt projector flood bulbs in bullet-shaped housings aimed to graze the trunks. Light from the double mushroom unit brings color into the scene from the many-hued dahlias.

adding dramatic effects to blue spruce, evergreen and birch trees.

Where flying insects are a major problem, saturated (intense) yellow light is often used. To insects, this light is less visible, and therefore less attractive, than white light. Since mercury light is very attractive to insects, it is best to use mercury lighting at a distance from outdoor living areas.

GUIDING TECHNIQUES

Garden sculpture, pools and special landscape features, as well as their location with relation to points of viewing, influence the choice of area to be lighted. The most pleasing results come from a



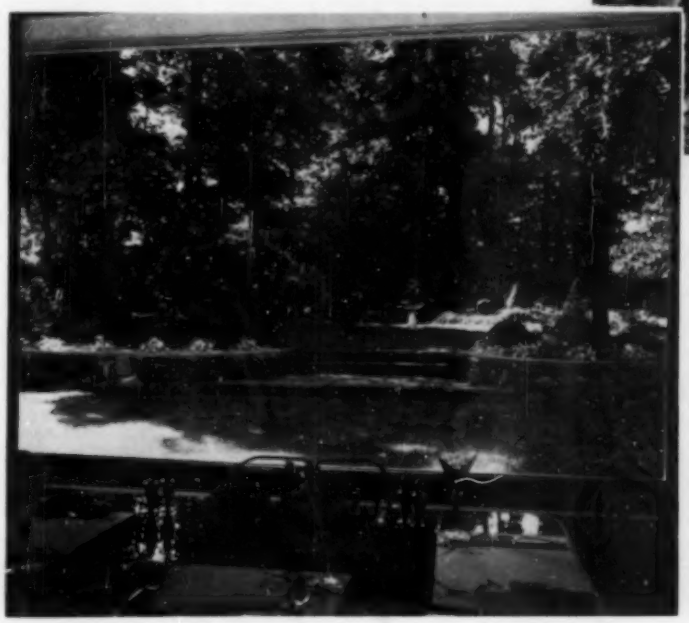


Figure 149 (left and above). The garden beyond the picture window can become a fairyland of light, shadow and color after the sun sets. A low level of over-all lighting is obtained from two 150-watt projector flood bulbs located on the house; the plantings and trees behind the bird bath become the center of interest as they take on a mystical glow from a mercury floodlight; trees to the right and left are lighted from below, making them appear as lacy sentinels against the night.

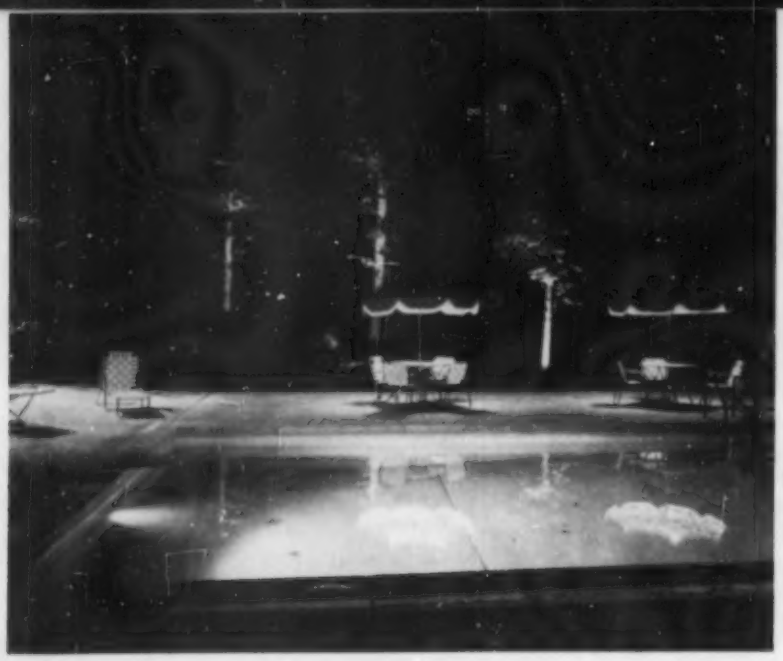


Figure 150. Home swimming pools, large and small, should be lighted for nighttime dips by underwater fixtures mounted in niches in the walls. In addition, the area surrounding the pool should be lighted for safety, for pool-side snacks, and for beauty.

planned composition in brightness and color developed around a selected focal point such as a flower bed, a tree, a pool, a fountain or a piece of sculpture. The selected center of interest should usually be markedly brighter than anything else in the scene. Fascination comes from highlight and shadow, although black "holes" in the scene may be avoided by a low level of over-all floodlighting, usually obtained from floodlights mounted high on the house, in a tree, or on poles. See Fig. 149.

Subject matter should be analyzed for texture, form, line, reflectance and background to determine what to emphasize and how to accomplish the desired effect. Head-on floodlighting tends to make objects flat; modeling is obtained by lighting from both sides with more light from one side than from the other. Light striking a surface at a very narrow angle emphasizes texture of plants, fences, buildings or ground covers. Translucency, depth, form and pattern of foliage may be accentuated by back lighting; in addition, a low light should be directed on the front side.

The sensation experienced from outdoor lighting depends to a great degree on the brightness level. The lighting may be subdued, stimulating or dramatic, depending on what is desired and the way in which it is accomplished. In areas viewed in dark surroundings, where there is no competing light from street lights or from lighted areas indoors or out, very low levels may be appropriate. When lighted garden scenes are viewed from indoors or from lighted terraces, considerably higher brightness levels are required in order to achieve equal effectiveness.

Figure 151. When architectural design and landscaping are closely integrated, nighttime outdoor lighting is essential in retaining the continuity between interior and exterior. Properly located lights pick up tree forms, bring out the colorfulness of flowers and make an outdoor dining area useful after sunset. Photograph courtesy of *House Beautiful*.

CHAPTER VII

Dimmers for Light Control

The desire for more flexibility in lighting from residential types of fixtures, portable lamps and architectural lighting installations has led manufacturers to develop dimming equipment specifically designed for residential use. Dramatic changes in the mood and atmosphere of a room can be effected by varying the illumination level. A lighting system designed to provide a high level of functional illumination, if controlled by a dimmer, can serve to create varying effects—stimulating or relaxing. As dimmers become more widely understood and easily obtainable, the limited "on" or "off" lighting of today's interiors may become "yesterday's limited light control."

Residential dimmers are designed for capacities from 200 watts up. They are compact in size and completely self-contained units which can be mounted into wall structures in much the same manner as ordinary "on-off" switch boxes. Dimmers which provide several levels of illumination or continuous control from "off" to full bulb brightness are variable autotransformers or resistance-type dimmers. The power consumed by the autotransformer-type dimmer varies with the selected light level. The resistance-type dimmer, on the other hand, consumes an appreciable amount of electricity even though the bulbs or tubes are operated at less than full light output.

INCANDESCENT

There are several sizes and varieties of dimmers for incandescent bulbs which may be installed in the wall to control ceiling and wall fixtures, architectural installations, and lamps plugged into convenience outlets. These dimmers permit operation of the lighting unit or system at any desired level from full brightness to "off" by the simple means of rotation of the selector-knob. Each manufacturer includes with his product wiring instructions which should be followed when making installations. The dimmer takes the place of an ordinary wall switch.

A recent development is a high-low switch, made in several capacities, which can be used in an ordinary wall box to replace a conventional "off-on" switch. In addition to the "on-off" position, the high-low switch has positions for "high," for full light output of the bulbs, and "low," for 30 per cent of light output. This is strictly an alternating-current device, operating by means of a built-in half-wave rectifier. It can be used to control incandescent bulbs only.

It should be noted that in dimming incandescent bulbs, the light becomes yellower as the dimming is increased.

Figure 152 (above and below). By rotating the selector-knob located on the dimmer plate, rooms or areas may be illuminated to desired levels for a variety of activities or for the creation of an atmosphere which may be either stimulating or relaxing.

FLUORESCENT TUBES WITH DIMMING BALLASTS

Dimmers are available to control the 30-watt (36-inch) rapid-start or 40-watt (48-inch) preheat-rapid-start T-12 (1½-inch diameter) fluorescent tubes when used with the *dimming-type* ballast. One dimming ballast is required for each tube. Fluorescent tubes will dim more smoothly over the entire dimming range after the installation has been in operation for about 100 hours. The wiring for fluorescent tubes differs from that for incandescent bulbs and should be installed in accordance with manufacturers' instructions. With some dimmers used to control rapid-start-type fluorescent tubes, a conventional wall switch must be installed in addition to the dimmer control.

It is not possible to control incandescent bulbs and fluorescent tubes at the same time with the same dimmer since the wiring circuits are different. When ordering a dimmer, the type of light source to be used should be specified. The 30-watt rapid-start and 40-watt preheat-rapid-start tubes should not be mixed on any dimmer installation; all tubes should be of one size to assure uniform dimming.

CHAPTER VIII

Light Sources

A knowledge of the characteristics of both incandescent-filament and fluorescent light sources is essential to achieve good residential lighting design. This knowledge enables the designer to choose types appropriate in contour, light output, wattage, color quality and directional control for each application. To know how to work successfully with either type, or both in combination, will help the designer to achieve lighting results that are visually comfortable, functional and beautiful.

INCANDESCENT-FILAMENT SOURCES

The incandescent-filament bulb has been the major home electric light source for almost 75 years. Within the last 20 years the variety of residential bulb types, sizes and finishes has been greatly expanded. A few of the more unusual characteristics of these household bulb types will be discussed in this chapter.

Incandescent-filament bulb construction, shapes, sizes and bases commonly used for residential applications are as follows:

(1) *Bulb Construction*—There are three essential parts to an incandescent-filament source: a glass bulb, a metal base and a finely coiled wire filament. See Fig. 153. As electricity passes through the filament, the wire becomes so hot that it glows brightly, thus producing light by incandescence. This is the principle by which every incandescent light bulb produces light regardless of its finish, size or shape. It is known as a "point" source of light. In most bulbs the filament is mounted horizontally. However, the filament can be mounted vertically with respect to the base, thereby achieving an increase in light output. Bulbs using this type filament mounting were first introduced in residential sizes in 1957.

(2) *Bulb Shapes and Sizes* — Some of the more common incandescent-filament bulb shapes are shown in Fig. 154. The shape and size of light bulbs are designated by a code consisting of one or more letters and a number. The letters designate the shape, and the number indicates the maximum diameter of the bulb in eighths of an inch. For example, a 100-watt A-19 is a light bulb which consumes 100 watts, is of the standard "A" shape, and is 19/8ths of an inch or 2⅜ inches in diameter. Today light bulbs are being manufactured in compact sizes. The standard "A" bulbs in 25, 40, 50, 60, 75 and some in 100 watts have the same diameter. Three-lite bulbs, too, are physically smaller than they used to be.

(3) *Bulb Bases*—Most of the bases on incandes-

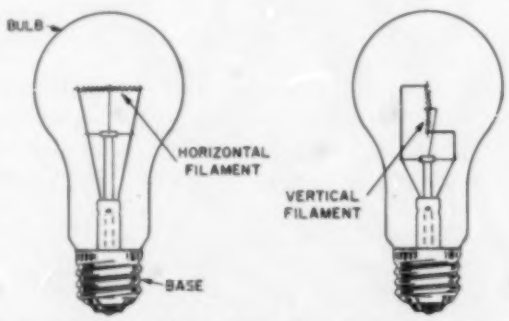


Figure 153. The three essential parts of an incandescent-filament bulb—the glass bulb, a metal base and a finely coiled wire filament.

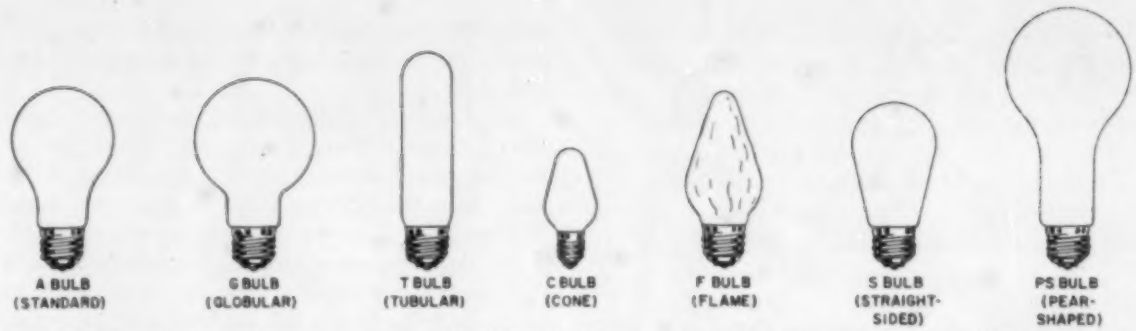


Figure 154. Some of the more common incandescent-filament light bulb shapes for residential application.

cent bulbs used in the home are of the screw type shown in Fig. 155. These are of metal and are cemented onto the glass bulb. Bases will vary in size according to the wattage and use of the light bulb.

The light from incandescent-filament sources is warm in color quality and imparts a friendly, homelike feeling to interiors. Under this light source the warm colors (the oranges, reds, browns, etc.) are enhanced while the cool colors, such as the blues and greens, are subdued. Generally, when the over-all atmosphere of a room is on the warm side, the full values of the warm colors will be acceptable when lighted with filament bulbs. While many of the blues and greens in fabrics, carpets, wallpaper and paint will be muted or slightly changed in color, there is not a general consciousness of these shifts.

In designing residential lighting, inside-frosted standard service bulbs ranging in wattages from 15 to 300 are the most commonly used types. Some of these wattages are available in other finishes. Today the white-coated bulbs that produce a softer quality of light and less harsh shadows are used in portable lamps and fixtures where greater diffusion is desired. Due to a fine white inner coating in these bulbs, light is distributed over the entire surface, eliminating the previously apparent bright spot near the center.

There are also tinted bulbs in yellow, pink, aqua, green and blue, 40 to 150 watts. These are recommended for locations where the specific effect of a warm or cool mood or atmosphere is desired. In general, tinted light subtly accents like colors and subdues complementary colors. Yellow and pink bulbs produce a warm color tint of light that intensifies warm colorings in home furnishings; aqua, green and blue bulbs give emphasis to cool colors in a decorative scheme. If desired, the appearance of a color scheme may be changed by using yellow and pink bulbs to subdue cool colors and aqua, green and blue bulbs to tone down warm colors. Seasonal changes can be made without resorting to more complex or expensive methods to achieve the color appearance of coolness in summer and warmth for the winter. In rooms which have neutral color schemes, tinted bulbs can subtly create quite different atmospheres.

The addition of color to incandescent bulbs will reduce the light output compared to that obtainable with either the inside-frosted or white-coated bulbs. It is suggested that to compensate for the reduced light output, tinted bulbs of the next higher wattage be used if approximately equal lighting results are desired.

Other incandescent-filament types frequently used in homes today are:

(1) *Three-Lite Bulbs*— These are available in combination wattages with medium bases in 30-70-100-, 50-100-150- and 50-200-250-watt sizes and with mogul bases in 50-100-150- and 100-200-300-watt sizes. Three-lite bulbs provide three different levels of lighting and are used primarily in portable lamps.

(2) *Silvered-Bowl Bulbs (60 to 150 Watts)*— These are standard bulb types, inside-frosted or clear, with a silver coating on the exterior of the bowl end. They are designed primarily for *base up* use (Fig. 156). The purpose of the opaque silver coating on this bulb is to direct all the light upward for reflection either by the ceiling or by a

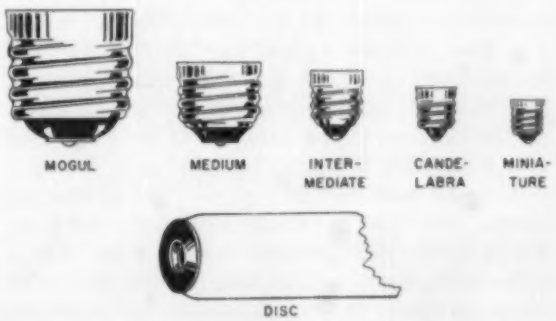


Figure 155. Six types of incandescent-filament bulb bases shown at one-half actual size.

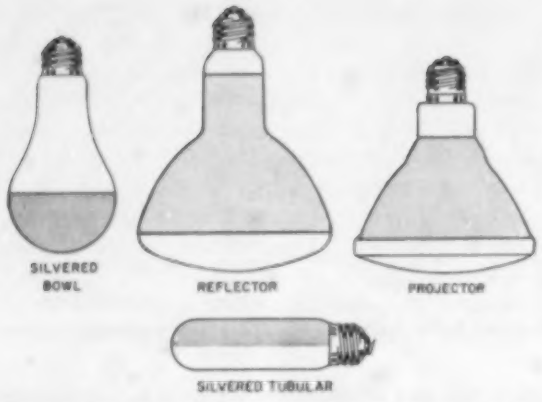


Figure 156. Examples of incandescent-filament bulbs with built-in reflectors.

reflector that is part of the fixture, and at the same time, to conceal the brightness of the filament when the bowl end of the bulb is viewed. The ceiling or reflector should be white for best results. An inside-frost or white bulb should never be used in a fixture or lamp designed for a silvered-bowl bulb.

(3) *Tubular Filament Sources*—These are of two types. The first is a lumiline bulb which is a tubular source one inch in diameter with a filament extending from end to end. They have disc-type bases (see Fig. 155) at each end which require special sockets. Lumilines are supplied in 30-, 40- and 60-watt sizes in clear, inside-frost, white and a variety of colors.

The second type, known as "showcase" bulbs, is available in three wattages, 25, 40 and 60 watts, all having a medium base. They are of either clear glass or inside-frosted finish. Some "showcase" bulbs are of the reflector type with half of the bulb silvered to direct the light and increase the quantity in a given direction. A bronze spring contact on the base permits the light to be directed as desired without the bulb being screwed tightly into the socket; thus the bulb can be used with the reflector oriented in any position.

(4) *Reflector (R-Type) Bulbs* — These have increased in number with the demand for more control-types of light sources for floodlighting and spotlighting. A reflecting coating is applied to a portion of the inside surface of the bulb to direct all the light out of the bowl end of the bulb. The *spot* bulbs have a very light frosting on the bowl end of the bulb, just enough to prevent filament images. The *flood* bulbs have a much heavier frosting to diffuse the light over a wider area. R-type bulbs now include medium base bulbs in sizes from 30 to 300 watts. Tint colors suitable for residential application — yellow, red, green, blue, pink and blue-white — are available in several wattages. These are "soft glass" bulbs and are therefore recommended by manufacturers for indoor installations *only*.

(5) *Projector Bulbs (PAR, meaning "Parabolic" Shape)*—These are another control-type of light source, producing spot- or floodlighting. They differ from the reflector bulbs in shape, are made of "hard glass" and can be used indoors or out-of-doors. Rain or snow or changes in temperature will not crack the glass or affect operation. PAR-38 projector bulbs have a medium base and are manufactured with clear glass lenses in 75- and 150-watt sizes. The 100-watt size is available in colors.

Reflector bulbs and projector bulbs can be used where a very definite application of either a moderately concentrated spotlight or a more widespread floodlight beam is desired.

All incandescent-filament bulbs, for the best lighting results and economical operation, should have the same voltage rating as that of the power supply line.

FLUORESCENT SOURCES

Fluorescent tubes, introduced in 1938, are a comparatively new residential light source. They produce light by an entirely different principle from incandescent-filament bulbs, as shown in Fig. 156. Many of the rooms illustrated in this report are lighted entirely with incandescent-filament bulbs, others with fluorescent tubes, and still others with a combination of both fluorescent tubes and incandescent-filament bulbs. It is now practical to work successfully with either of these light sources alone or in combination.

Fluorescent tubular sources offer the designer higher light efficiency, cooler operating temperatures and longer life than incandescent bulbs of comparable wattage. For these reasons they are most adaptable to and very commonly used in residential custom-designed built-in installations, as well as in surface-mounted and recessed fixtures.

Fluorescent Tube Sizes

Fluorescent light sources commonly used in the home range in size from the 4-watt, T-5, 6-inch length to the 40-watt, T-12, 48-inch length. (T means tubular and the number equals the diameter in eighths of a inch.) The length of tube given is in

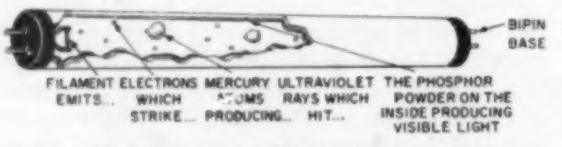


Figure 157. The process by which a fluorescent tube produces visible light is indicated by reading from left to right.

all cases the over-all nominal length which includes the two required sockets.

All fluorescent light sources require a current-limiting and control device called a ballast, which is located in a metal enclosure. For the operation of some fluorescent tubes an automatic switch known as a starter is required in addition to the normal wall switch. The starter is a small metal can inserted into the fixture body or channel and is a replaceable part. There are several methods of fluorescent tube operation commonly used in residences. Listed below are the sizes, lengths, bases and types of operation of fluorescent tubes suggested for residential use. Also included are circular fluorescent tubes.

PREHEAT—Require starters and take several seconds to light:

4-watt T-5—⅝-inch diameter, 6-inch length, miniature bipin base

6-Watt T-5—⅝-inch diameter, 9-inch length, miniature bipin base

8-Watt T-5—⅝-inch diameter, 12-inch length, miniature bipin base

13-Watt T-5—⅝-inch diameter, 21-inch length, miniature bipin base.

14-Watt T-12—1½-inch diameter, 15-inch length, medium bipin base

15-Watt T-8—1-inch diameter, 18-inch length, medium bipin base

15-Watt T-12—1½-inch diameter, 18-inch length, medium bipin base

20-Watt T-12—1½-inch diameter, 24-inch length, medium bipin base

25-Watt T-12—1½-inch diameter, 33-inch length, medium bipin base

30-Watt T-8—1-inch diameter, 36-inch length, medium bipin base*

RAPID-START—No starter required but requires rapid-start tubes and ballasts, lights within a fraction of a second:

30-Watt T-12—1½-inch diameter, 36-inch length, medium bipin base.**

PREHEAT-RAPID-START—A new universal tube which replaces the former preheat and rapid-start types. This new tube will operate equally well in either preheat or rapid-start fixtures, but with a time delay in fixtures with starters:

40-Watt T-12—1½-inch diameter, 48-inch length, medium bipin base.

TRIGGER-START—Preheat-type fluorescent tubes (14-, 15- and 20-watt) operate on a trigger-start ballast without starters and light in a fraction of a second.

CIRCLINE—A universal rapid-start type which will operate satisfactorily in all fixtures, although there will be a time delay in fixtures with starters:

22-Watt T-9—1⅛-inch diameter, outside diameter 8¼ inches.

32-Watt T-10—1¼-inch diameter, outside diameter 12 inches

40-Watt T-10—1¼-inch diameter, outside diameter 16 inches.

Another type of fluorescent tube termed *slimline* requires no starter and lights instantly. These vary in length from 42 to 96 inches, have single-pin bases, and come in three diameters: ¾, 1 and 1½ inches. Slimline tubes are less generally used in residential lighting installations as they require bulky sockets and larger and heavier ballasts than do the preheat and rapid-start tubes.

Fluorescent "Whites"

With the various fluorescent "whites" available, light can be produced ranging from a very cool blue-white to a warm pinkish-white. Today the skilled designer can work successfully with a palette of seven "whites" to create the atmosphere desired. Listed below are the seven "whites" with a description of the color characteristics of each:

*Improved-Color-Rendition Warm White**—Creates a warm atmosphere and blends well with incandescent bulbs. Enhances complexions, foods and warm tones in furniture, fabric and paint. For home use where warm colors predominate, color appearance is important and warm atmosphere is desired.

*Improved-Color-Rendition Cool White**—Flatters *all* colors and creates a cool atmosphere. This fluorescent color gives the most accurate color rendition of all fluorescent tubes but its cool light is quite different in appearance from the mellow, yellowish incandescent lighting usually found in the home. For residential use where cool colors predominate in the decoration and where a cool atmosphere is desired.

Warm White—A light which will blend with incandescent lighting but somewhat adversely affects both warm and cool colors.

Cool White—Light which produces a cool atmosphere, but dulls warm colors and intensifies cool colors.

White—Compromise between warm white and cool white; slightly dulls the appearance of warm colors.

Daylight—Very blue-white light seldom used in homes because it grays complexions, dulls warm colors and creates a very cold atmosphere.

*The 30-watt preheat tube may fit but will not light in fixtures designed for 30-watt rapid-start tubes.

**Rapid-start tubes will operate satisfactorily in preheat and trigger-start fixtures but with a slight time delay.

*To produce the improved-color-rendition achieved, about 25 per cent of the light output is sacrificed. Improved-color-rendition tubes should be used where color appearance is of importance.

Soft White—Pinkish-white light that emphasizes reds and pinks but has a tendency to gray cool colors.

The choice of fluorescent tubes now becomes simply a matter of deciding first whether a warm or a cool atmosphere is desired for any room. Therefore, when room atmosphere and color rendition are of prime importance, the corresponding improved-color-rendition warm or cool tube would be chosen; otherwise, the warm, warm white or cool white tubes will serve if light output is the more important requirement.

All white fluorescent tubes look alike when unlighted. The name of the color white (which varies among manufacturers), as well as the wattage of the tube, is printed on the glass tube at one end. Fluorescent tubes in color—red, pink, blue and gold —may be used for a decorative accent or combined to produce a desired blending of colors.

In selecting fluorescent lighting equipment, the advice of experienced dealers or lighting designers should be sought. If equipment is selected that does not supply the light needed for a given location the condition cannot be simply remedied, since higher wattage tubes that give more light are longer and cannot be used to replace tubes that are inadequate in light output for the situation.

Current passing through a ballast produces a low humming sound. Generally this faint sound is not noticeable with even less than average noise levels. Once in a while there is an exceptional case where the room noise level is very low because of isolated surroundings or more than average insulation. In these unusual cases, if the lighting method requires a number of ballasts, it is recommended that they be placed in ventilated metal boxes in a remote location—attic, basement or closet. Ballasts should be located to be easily accessible and where no obstruction of any kind can prevent ventilation or circulation of air around the metal box.

Fluorescent tubes may produce interference (noise) in radio reception although television reception is not affected. Locating the radio and its aerial at a distance of about nine feet from fluorescent tubes or installing proper radio interference filters will reduce direct radiation from the tube, radiation from power supply lines or line feedback.

A complete listing of all types of light sources for possible residential lighting use is too extensive to be included here. Detailed, current data are obtainable from light source manufacturers.

GUIDE TO SELECTION OF LIGHT SOURCE TYPE

Whereas incandescent-filament light bulbs fill the need for providing a "point" source of light, fluorescent tubes furnish "lines" of light. Here are some of the characteristics and uses for each:

Incandescent-Filament Bulbs

(1) Provide a point source of light that can be focused or directed over a limited area if desired.

(2) Most household bulbs have the same size base, thus lighting from fixtures or lamps can be increased or decreased within certain limits by a change to bulbs of a different wattage.

(3) Most types are less expensive to buy than fluorescent tubes. Incandescent lighting fixtures are also generally less expensive; they require no ballast or starter.

Fluorescent Tubes

(1) Provide a line of light, thus in work areas the light coming from several angles tends to wipe out the shadows. These "lines" of light can also be used over mirrors, kitchen work surfaces and in window valances, cornices and coves or other architectural features to provide both useful and decorative illumination.

(2) Provide three to four times as much light per watt of electricity as incandescent-filament light bulbs, with less heat produced.

(3) Will operate about 7 to 10 times longer than incandescent bulbs before replacement is required.

In today's home both incandescent bulbs and fluorescent tubes can be used independently or together depending upon the lighting design, the results desired and personal preference.

Lighting . . . Keyed to Today's Homes—Reprint

The three installments of "Lighting . . . Keyed to Today's Homes," are being combined for reprinting as a separate booklet. Additional pages will be added to include a guide to interior design characteristics, color reflectance chart, footcandle table, glossary, bibliography and index. The booklet, of approximately 90 pages, will have an attractive, specially-designed cover. Completion is expected in February, 1961. Orders may be placed, and prices obtained, from the Illuminating Engineering Society, Publications Office, 1860 Broadway, New York 23, N. Y.

A.I.A. File No. 31-f

INSTALLATION AT GATE 14, LOGAN AIRPORT, EAST BOSTON, MASS.

Lighting an Airport Service Area

LIGHTING OBJECTIVE: To provide illumination at an airport to enable pilots to taxi aircraft into position for the loading, unloading and servicing functions and to provide lighting for personnel to perform these functions.

GENERAL INFORMATION: Northeast Airlines, which occupies Gate 14, has a frontage of 380 feet along the curved ramp shown above. Aircraft are parked from 30 to 120 feet out from the building.

INSTALLATION: Ten Sylvania Lighting Products catalog No. CFRA-1V28 luminaires are installed horizontally on 30-foot centers 18 feet 6 inches above ground level on the curved ramp building. Each luminaire is eight feet long, equipped with one 96-inch T-12, 1500-ma, cool white fluorescent lamp, and has a sharp horizontal cut-off.

Luminaires were focused at maximum limit for coverage while still retaining the sharp cut-off angle to minimize glare viewed from the taxiing pilot's location. Luminaires were aimed to provide most light 60 to 90 feet out from the building. Illumination levels were: average horizontal throughout, approximately 2 footcandles; average vertical at the line joining the centers of the plane position circles, approximately 4 footcandles.

Lighting designed by David L. Marx, Sylvania Lighting Products, Wheeling, W. Va. and Eugene L. Kritter, Electrical Engineer for Northeast Airlines, Boston, Mass.

Lighting data submitted by David L. Marx as an illustration of good lighting practice and to aid in the design of similar installations.

Published by the Committee on Publications of the Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y.

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A.I.A. File No. 31-f

Engineering Designs for Residential Lighting

By NORMAN FALK

This paper discusses the systematic application of the classic techniques of analysis of lighting systems and luminaire design to fulfill the requirements specifically dictated by the needs of the modern home. Luminaire performance is quantitatively evaluated as a function of meeting established home lighting requirements.

THE LIGHTING industry, acting through the Illuminating Engineering Society, has, over the years, accumulated a body of experience and knowledge, and formulated standard design, measurement, and evaluation criteria that influence and regulate most activities in the lighting field today.

The criteria, used to establish luminaire designs, express photometric performance, predict and evaluate in-service results, and indicate degree of visual comfort; as well as establish both qualitative and quantitative seeing task requirements; have served to bring about far-reaching improvements in the lighting of industrial, street and highway, commercial and institutional areas.

The application of these and similar criteria to the entire field of residential lighting can be a major step in the direction of providing seeing conditions in the home, as high in quality as those to which we have become accustomed in other areas of daily activity.

The concept of providing a basic engineering solution, based on safety and seeing, for each dwelling, as part of the basic structure of the home, and then superimposing upon this the lighting for mood, decor, and esthetic effect, as dictated by the personality of the occupant, was first enunciated at the 1955 IES National Technical Conference.[1]

At that time, the discussion concerned the application of existing commercial lighting distributions to the home to accomplish specific illumination objectives. But the systematic application of the classic techniques of luminaire design, to fulfill a set of predetermined performance requirements, specifically dictated by the needs of the home, has not been industry practice until recently.

Now, principles of prismatic lens and refractor design have been applied in developing luminaires for exclusive home use, and the results can be expressed in the standard language and shorthand of the illuminating engineer.

Outdoor Ceiling-Mounted Luminaire

An outdoor, surface-mounted luminaire employing a prismatic light-controlling enclosure is one of the new, specifically residential designs. (See Fig. 1.) In this luminaire in order to produce adequate illumination directly underneath the luminaire, as well as to project light out laterally, to provide illumination over a substantial radial area, a re-

A paper presented at the National Technical Conference of the Illuminating Engineering Society, September 11-16, 1960, Pittsburgh, Pa. AUTHOR: Holophane Co., Inc., New York, N. Y.

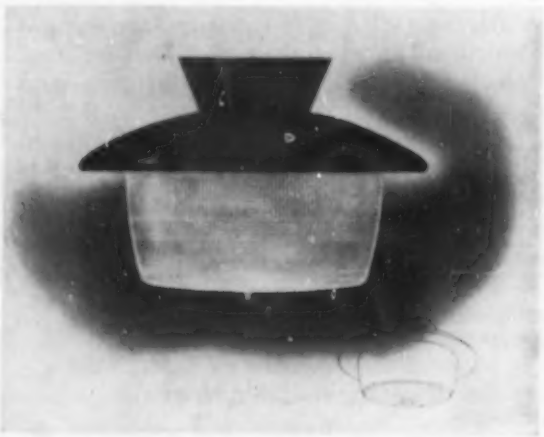


Figure 1. Residential outdoor ceiling-mounted luminaire utilizing a prismatic glass enclosure to control light output for wide distribution.

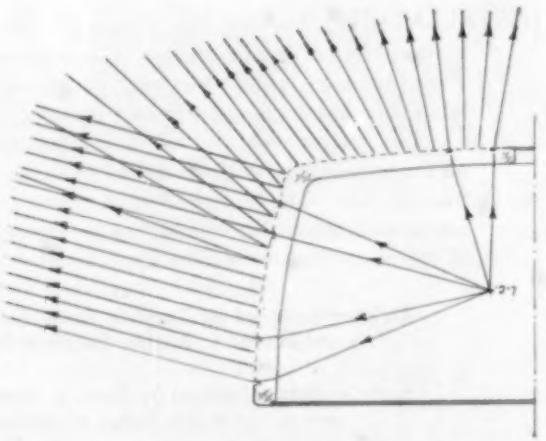


Figure 2. Cross section schematic of outdoor refractor and light rays, with dual prismatic function for "down" and "widespread" light distribution.

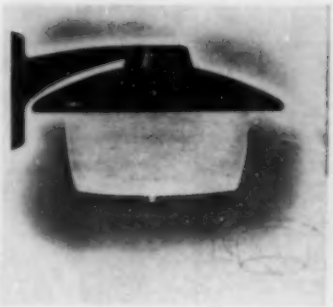


Figure 3. Dual-prism refractor optics applied in a wall-mounted luminaire.

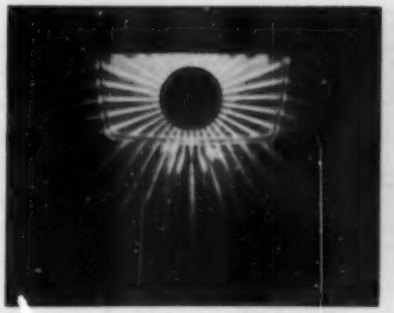


Figure 4. Actual cross section of outdoor refractor showing control of light predicted in Fig. 2.

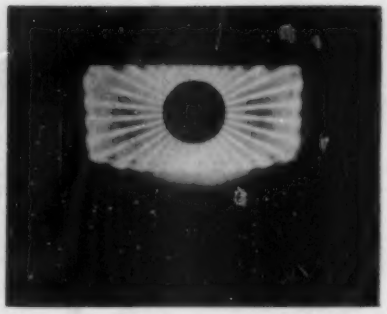


Figure 5. Cross section of diffusing bowl showing no discernible, effective distribution pattern.

fractor, with dual-functioning prismatic structure, has been designed. Fig. 2 illustrates the actual control over light rays generated by the source, one of the luminaire's two standard, inside-frosted, 60-watt incandescent lamps. There are two separate and distinct patterns of emitted light: down-light to illuminate the activity directly underneath the unit (doorway, porch setting, vehicle in carport, outdoor barbecue, etc.), and high-angle beam-light to illuminate the surroundings. Of course, these optics can be used on buildings in other than ceiling-mounted luminaires. (See Fig. 3.)

Other than schematically, the light controlling action can be shown by means of a section of the refractor, cut directly through its center, and a slotted can surrounding a light source. The rays of light thus produced can easily be traced and, in Fig. 4, again show the dual pattern of the light distribution. The uppermost ray emitted from the refractor passes through the glass flange which, in the luminaire, is covered by the metal housing, and does not have its direction changed prismatically, and when compared to the adjacent ray, a measure of the degree of refraction of light can be seen.

An interesting analysis can be made by comparing this prismatic luminaire to a standard residential diffusing enclosure type of unit, used for similar lighting applications.

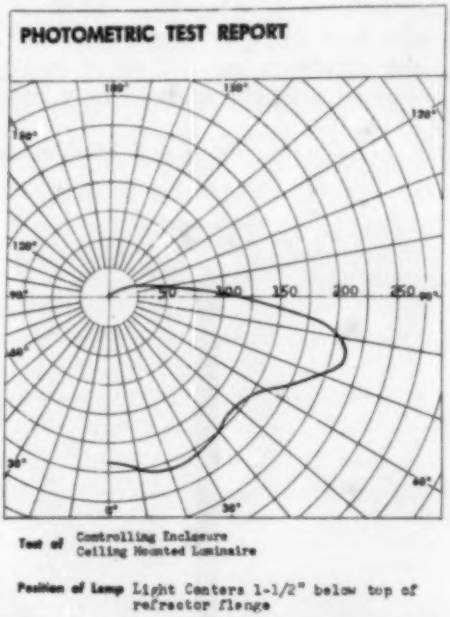


Figure 6. Photometric distribution curve of prismatic luminaire, depicted in Fig. 1, showing both downward and widespread component of light. Lamp—two 60A, C, IF; lumens—1680; watts—two 60; bulb—A-19-IF; test distance—25 feet; test cell No. G-5; volts—120; filament—CC-6.

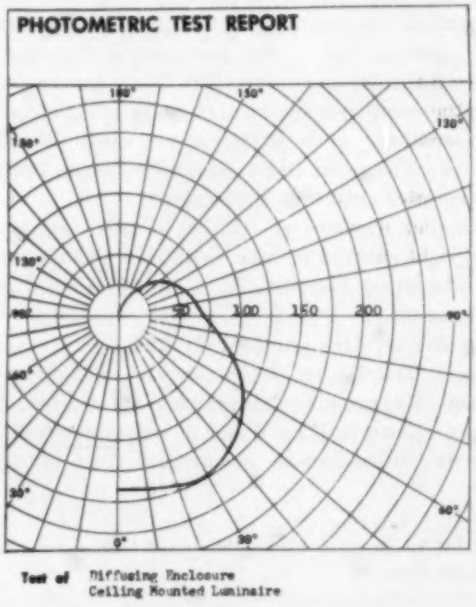


Figure 7. Photometric distribution curve of diffusing bowl. Lamp—two 60A, C, IF; lumens—1680; watts—two 60; bulb—A-19-IF; test distance—25 feet; test cell No.—G-5; volts—120; filament—CC-6.

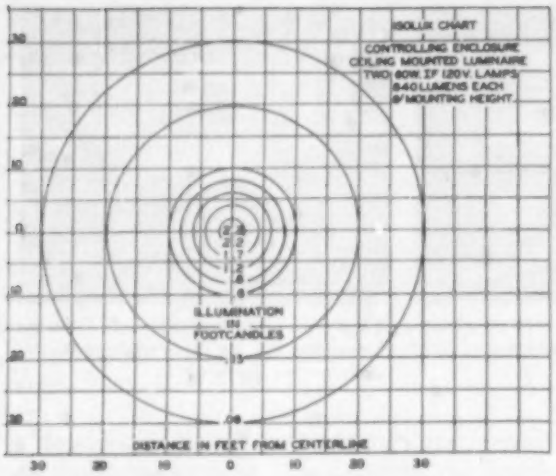


Figure 8. Isolux indicating actual footcandles produced on ground with prismatic luminaire of Fig. 1, mounted 8 feet above grade. Adequate illumination out to 30 feet.

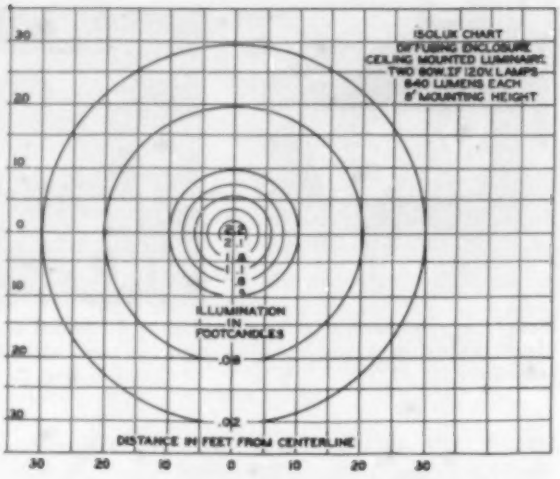


Figure 9. Isolux indicating footcandles provided on ground with diffusing enclosure mounted 8 feet above grade. Sharp reduction in illumination beyond 20 feet.

An analogous cross section, taken from the diffusing globe, has no discernible effective distribution pattern, as seen in Fig. 5.

To express these controlling and diffusing actions quantitatively, the standard candlepower distribution curve can best be used.

Fig. 6 shows that the controlling enclosure, specially designed for this purpose, provides its maximum beam output at 75 degrees from nadir, for wide spread of light, in addition to a substantial downward component from 0 degrees to 40 degrees.

Comparing this to the photometric distribution of the diffusing enclosure (Fig. 7), it can be noted that the candlepower at 0 degrees is approximately the same for both units, when using identical sources. The prismatic luminaire achieves 136 per cent greater output at 75 degrees.

Another measure of relative effectiveness is the total light emitted in various zones. Table I shows an interesting comparison of control *vs* diffusing enclosure.

Of course, data immediately and directly applicable to installation design are the most practical forms of expressing luminaire performance. The isolux, shown in Figs. 8 and 9, indicate actual, delivered footcandles on the ground from an eight-foot mounting height, and can be directly applied in the field. As expected, significant amounts of illumination, based on general usage outdoor values, are projected only by the controlling prismatic luminaire as far as 30 feet out from the source.

TABLE I—Outdoor Ceiling-Mounted Luminaire—Zonal Output Data.

Zone Degrees from Nadir	Per Cent of Total Lamp Lumens Using Two 60-Watt IF Lamps	
	Prismatic Controlling Enclosure	Diffusing Enclosure
0-60 (down)	28.3	25.8
60-90 (widespread)	33.9	17.0
0-180 (total)	71.5	59.9

Outdoor Post and Bracket-Mounted Luminaire

To provide the most useful distribution of light from a unit mounted on a post in front or backyard, along driveway or building, and for mounting heights from 24 inches above the ground, for flower and shrubbery lighting, up to eight feet high, a special prismatic enclosure has been designed (Fig. 10).

Again, two separate components of illumination

Figure 10. Prismatic post luminaire designed for maximum spread of light.

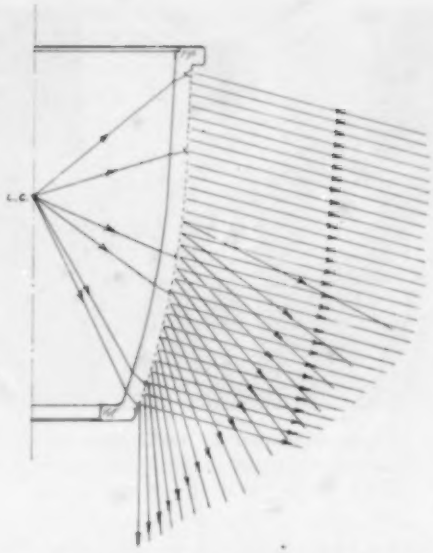


Figure 11. Schematic light-ray pattern of prismatic post luminaire enclosure showing dual-prismatic function.

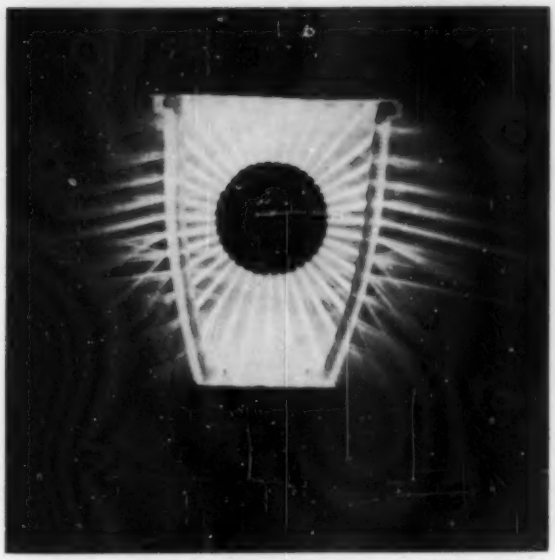


Figure 12. Cross section of prismatic post luminaire showing actual refraction characteristics.

are provided (Figs. 11 and 12), with particular emphasis on light emitted above 60 degrees to assure widest possible spread of light. Prismatic action, illustrated in Fig. 11, has incorporated into its design the characteristic of breaking up light from the source in such a manner as to obscure the source itself, and to provide uniform luminance over the entire surface of the refractor. A comparison of the zonal efficiencies of the prismatic post top to a wall-bracket luminaire, employing the identical optical train, except for a smaller reflecting top cover, and to a similar standard, diffusing type of luminaire, indicates that changing from an 18-inch diameter reflecting top cover to an 11-inch cover, while maintaining all other prismatic optical characteristics, results in relatively small reductions of zonal and total luminaire output (Table II). However, a change to a non-controlling enclosure incurs efficiency reductions of 58 per cent in the 60- to 90-degree zone, and 34 per cent in total output.

Translated into terms of particular interest to the home owner (Fig. 13), such differences in efficiency can be reflected in savings incurred by the use of fewer luminaires to provide illumination for a given area; use of low-wattage lamps to achieve a desired lighting result; or, preferably, improved home illumination.

TABLE II—Outdoor Post- or Bracket-Mounted Luminaire—Zonal Output Data.

Zone Degrees from Nadir	Per Cent of Total Lamp Lumens Using 100-Watt IF Lamp		
	Prismatic Controlling Enclosure Post Mounted	Prismatic Controlling Enclosure Wall Mounted	Diffusing Enclosure Wall Mounted
0-60 (down)	33.2	23.5	20.7
60-90 (widespread)	44.1	40.8	16.6
0-180 (total)	80.4	72.8	53.2

Indoor Recessed Luminaire

As enunciated in the "Recommended Practice for Residence Lighting,"[2] since recessed luminaires are part of the structure, they must be skillfully

Figure 13. Footcandles produced on ground by refractor type of post luminaire with 100-watt IF lamp, mounted 8 feet above ground.

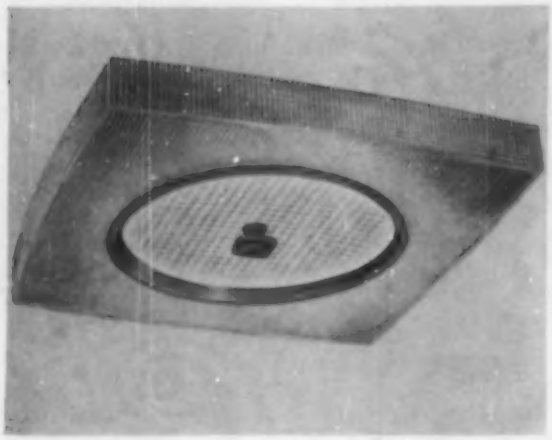


Figure 14. Low brightness residential recessed luminaire with injection molded acrylic prismatic ceiling trim.

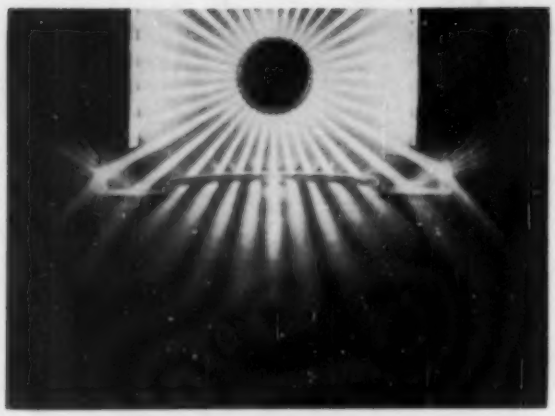


Figure 15. Cross section of controlling incandescent recessed luminaire. Light in high-angle glare zone is bent down to work or up along ceiling.

planned[3] and exactly specified.[4] Now performance criteria for commercial interiors, established over the years, have been applied in the design of a residential, recessed, incandescent luminaire. Also, the manufacturing techniques of precision injection molding of acrylic prismatic plastics, perfected for the commercial lens market, have been employed successfully to produce a luminaire with a plastic, prismatic, light-controlling trim, completely eliminating the need for metal framing of the bottom enclosure (Fig. 14).

The combination of such a prismatic trim, and glass-bottom lens-plate, provides a distribution of light as shown in Fig. 15. Light is refracted out of the high-angle glare zone down to the work task, or up along the ceiling to relieve contrast.

The photometric distribution curve of this unit (Fig. 16) shows sharp cutoff above 45 degrees and a maximum candlepower at 33 degrees, assuring uniform illumination coverage on a horizontal surface up to 1.5 times the unit's mounting height.

A comparison of such a controlling luminaire

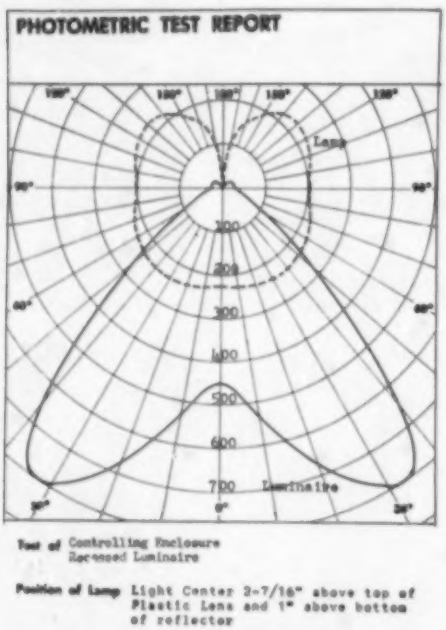

PHOTOMETRIC TEST REPORT
Lamp
Luminaire
Test of Controlling Enclosure Recessed Luminaire
Position of Lamp Light Center 2-7/16" above top of Plastic Lens and 1" above bottom of reflector

Figure 16. Photometric distribution curve of luminaire in Fig. 14. Wide spread of light below 45-degree cutoff angle allows spacing ratio up to 1.5:1.0. Lamp—C, IF; lumens—2700; watts—150; bulb—A-23-IF; test distance—25 feet; test cell No.—G-5; volts—120; filament—CC-6.

TABLE III—Coefficients of Utilization. Recessed Luminaire with Controlling Enclosure 150-Watt IF Lamp.

Floor		30%			
Ceiling		80%		50%	
Walls		50%	30%	50%	30%
	Room Index	Coefficients of Utilization			
J	0.6	.34	.30	.33	.29
I	0.8	.43	.38	.41	.37
H	1.0	.49	.44	.47	.42
G	1.25	.55	.49	.51	.47
F	1.5	.59	.54	.55	.51
E	2.0	.65	.59	.59	.56

Zonal-Factor Interflectance Method

TABLE IV—Coefficients of Utilization. Recessed Luminaire with Diffusing Enclosure 150-Watt IF Lamp.

Floor		30%			
Ceiling		80%		50%	
Walls		50%	30%	50%	30%
	Room Index	Coefficients of Utilization			
J	0.6	.19	.16	.18	.15
I	0.8	.24	.20	.23	.20
H	1.0	.28	.24	.26	.23
G	1.25	.32	.27	.30	.26
F	1.5	.35	.30	.32	.29
E	2.0	.39	.35	.36	.33

Zonal-Factor Interflectance Method

Figure 17 (below). Light pattern as emitted by recessed diffuser.

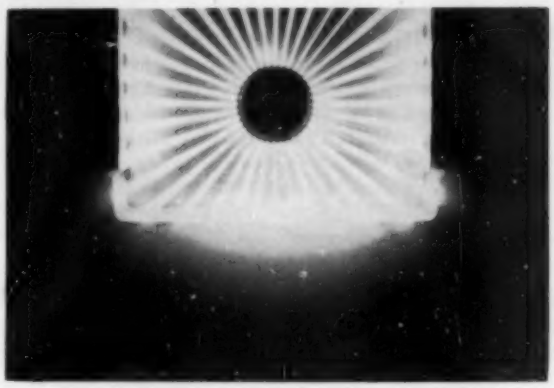
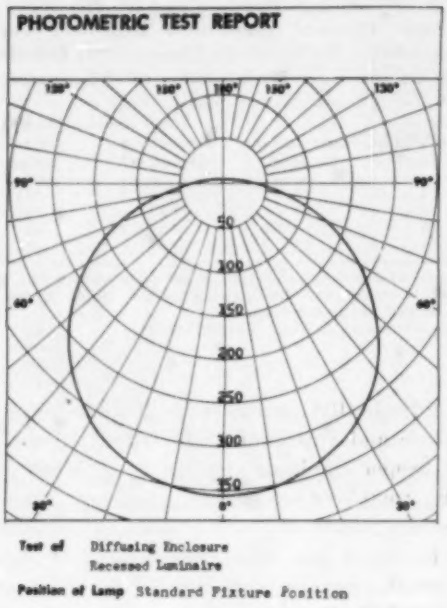


Figure 18 (right). Cosine type of distribution curve of recessed diffusing luminaire. Relatively little cutoff of high-angle brightness is provided. Lamp—C, IF; lumens—2700; watts—150; bulb—A-23-IF; test distance—25 feet; test cell No.—G-5; volts—120; filament—CC-6.



with a regular, drop-opal diffusing luminaire, in common household use today, is interesting. It shows that efficiency, as expressed by the coefficient of utilization (Tables III and IV), is improved considerably with careful prismatic design, as could be expected when the cosine-type distribution of the diffuser, illustrated on the cutaway section of Fig. 17, and quantitized on the candlepower locus in Fig. 18, is considered.

A comparative analysis of lumen output (Table V) reveals that a specially designed controlling enclosure can provide 82 per cent more light down directly to the work, reduces uncomfortable glare-brightness by 46 per cent, projects 206 per cent more luminous flux out along the ceiling, and operates with total of 52 per cent more output, when compared to a common residential diffuser.

A comparison of the average brightness of the luminaires as a function of vertical angle from nadir (Fig. 19) re-emphasizes the conclusions drawn from an analysis of the zonal flux distribution; namely, maximum output in the "use-zone" and sharp reduction of brightness at high, glare angles. To express this in terms relating directly to the comfort of those living under the lighting system, a visual comfort analysis (Table VI) has been prepared. Since it is desirable to design visual environments that are represented by a Visual Comfort Factor of 75 per cent or more, the use of carefully engineered residential luminaires is indicated when standards of comfort and performance, accepted universally as preferred usage in commercial and institutional areas, are desired.

TABLE V—Recessed Luminaire—Zonal Output Data.

Zone Degrees from Nadir	Per Cent of Total Lamp Lumens Using 150-Watt IF Lamp	
	Prismatic Controlling Enclosure	Diffusing Enclosure
0- 60 (down-light)	57.5	31.6
60- 90 (glare light)	6.3	11.8
90-180 (ceiling light)	4.6	1.5
0-180 (total output)	68.4	44.9

Summary

Superimposed on this need for more effective engineering design for residential use, of course, are the requirements of appropriate styling and good taste. The luminaires represented in this paper

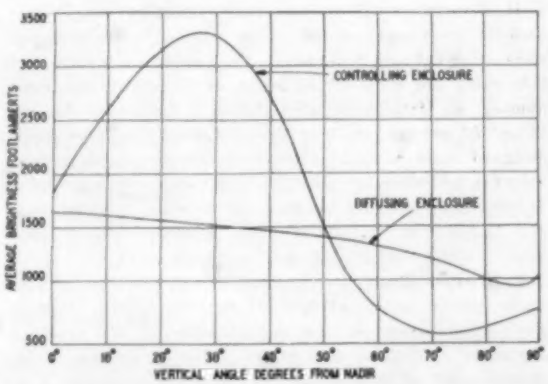


Figure 19. Average brightness comparison of recessed residential luminaires. Increased output below 50 degrees and brightness reduction above 60 degrees permit more efficient and comfortable design of interiors with prismatic controlling enclosure.

TABLE VI—Visual Comfort Table—One 150-Watt IF Lamp, Recessed Luminaire. Reflection Factors: Ceiling—80%; Walls—50%; Floor—30%. Calculations Based on Average Illumination of 30 Footcandles.

Room Width (in feet)	Room Length (in feet)	Visual Comfort Factor	
		Controlling Enclosure	Diffusing Enclosure
10	10	100	80
10	15	80	50
15	10	85	23
15	15	80	15

This table indicates the percentage of normal observers who may be expected to experience visual comfort when seated in the least favorable positions in the room.
Computations based on Logan-Lange paper.[5]

may indicate that such a fusion of outstanding performance and appearance can indeed be achieved when proper emphasis is given to all steps in the highly complex process of residence luminaire design.

It is hoped that this development of lighting equipment, specifically engineered for the home, is only the first step in bringing the kind of comfort and see-ability into the home that we have become accustomed to in our work and play environments.

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1. Keller, Clarence C.: "Engineered Home Lighting Using Prismatic Lenses and Refractors," ILLUMINATING ENGINEERING, Vol. LI, No. 6, page 470 (June 1956).

2. "Recommended Practice for Residence Lighting," ILLUMINATING ENGINEERING, Vol. XLVIII, No. 8, page 664 (August 1953).

3. Page, Aileen M.: "Structural Lighting in a Modern Home," ILLUMINATING ENGINEERING, Vol. XLVII, No. 10, page 553 (October 1952).

4. Leighton, Kaye A.: "Pre-Plan, Pre-Wire to Protect Your Buyer," *Practical Builder* (December 1952).

5. Logan, H. L. and Lange, A. W.: "The Evaluation of Visual Comfort Data," ILLUMINATING ENGINEERING, Vol. XLVII, No. 4, page 195 (April 1952).

DISCUSSION

J. H. JENSEN AND K. A. STALEY:* There has long been a need for more engineering principle applied to the design of residential lighting equipment. The luminaires described in this paper are excellent examples of the slowly-increasing number of "engineered-with-styling" luminaires for the home. At present, much of the equipment that is carefully designed from a light distribution standpoint is suitable only for commercial application. Such equipments are often difficult to install in a house, but even when installed properly they often look out of place or conspicuous by their lack of residential styling and appropriateness.

This paper illustrates remarkably well how careful prismatic control can direct light where it is desired. Further, the author compares the performance of his prismatic luminaire with those that utilize diffusing glassware only. However, all of these luminaires, with the exception of the recessed unit, are intended to replace existing porch and post lanterns. Such lanterns almost exclusively use clear (or lightly etched or patterned) glass "shielding." Perhaps comparisons with these types of luminaires would have been more in order.

One of the real complaints about most of today's porch and post lanterns is that they do not put usable light downward, where it is needed on walks and steps, but allow annoying bare-bulb brightness to interfere with comfortable seeing. With prismatic control, light can be directed downward into the useful zone, but in these particular luminaires light is directed into a very widespread pattern as well. Is this always a desirable distribution for residential post lights? It is if the luminaires are to be used in a series to light a long driveway or are used in a parking area or other space where a large area is to be lighted and the luminaire is not to be viewed for a long period.

Since many residential porch and post units need to light only a relatively small area and are in constant view of neighbors and passers-by it might be interesting to investigate a prismatic design that would direct most of the luminaire's output downward. Only a small amount of light might be aimed above 60 degrees to give the unit luminosity and to softly light the front of the house.

Testing by experienced home lighting observers has shown that the author's suggested mounting height of about 8 feet for the post top unit was most acceptable for post lantern use. Remarkable results seem attainable when using this same luminaire in a very low mounting position; for example, a one-foot mounting from ground to bottom of husk would be excellent for driveway and path lighting. Calculations based on the IES recommended level of one footcandle indicate that this unit could be spaced on 18-foot centers at this one-foot mounting height. A two-foot mounting would be acceptable for locations where viewers would not see the unit from great distances.

The indoor recessed luminaire described by the author fills a great need for efficient luminaires that are recessed but have the popular dropped trim. Almost all of these types on the market today are nothing more than a lamp in a box. Their white glass diffusers, dropped from the ceiling, contribute light to the viewer's eyes and do very little to relieve contrasts on the ceiling. The luminaire in Fig. 14 does not direct light into normal viewing angles, and experience has shown that it is comfortable to view from all normal positions. The luminaire has an excellent utilization which makes it suitable for possible use in halls, family and recreation rooms, libraries, and specific task illumination in kitchens, baths and laundries.

ELIZABETH A. MEEHAN:* I can imagine the post lamps described in this paper, used 15 to 25 feet on either side of a walk or drive, creating a wide and gracious pathway of light for callers. However, I feel, that if this unit was installed immediately beside the walk or drive as is normally done, guests would feel annoyance because of the glare. This, of course, is not the fault of the excellent post lamp but of its location.

The wall bracket shown in this paper could well be used at a corner of the house, on a garden wall or attached to a tree where its high efficiency could be put to excellent use. I would hesitate to use it at a doorway, however, because I feel sure guests would be disturbed by the brightness of the refractor and of white or light-colored siding or a white door. Generally, a greater number of lower-wattage units create a more pleasant and comfortable effect near the viewer than a few higher-wattage units.

The efficiency and distribution of the indoor recessed square are admirable. However, the styling resulting directly

*General Electric Co., Cleveland, Ohio.

*Philadelphia Electric Co., Philadelphia, Pa.

rrom the engineering design imposes limitations on its application. This unit could well be used to great advantage in kitchens and laundries where function and efficiency are of greatest importance. Kitchens and bathrooms, however, formerly considered as purely utilitarian areas, are now treated decoratively with as much care and imagination as the living room, which imposes an esthetic criterion on essentially functional items. I feel this unit, despite the excellence of performance, is restricted to areas where decor is of minor importance. If some of the technical achievements of a luminaire must be sacrificed for appearance such modifications must be accepted; people live in a total esthetic environment, not in a single area performing a single task.

N. S. FALK:* First, I should like to thank Messrs. Jensen and Staley, and Miss Meehan for their most constructive comments, which have led to some immediate, further investigations in this field.

Messrs. Jensen and Staley comment on the use of diffusing glassware in the analytic comparison of outdoor luminaires. This type of enclosure was chosen since, in such luminaires, at least some attempt is made to control the brightness by means of diffusion. Comparisons of luminaires of other sizes, shapes, degrees of diffusion, etching and ribbing, as well as other materials, could very profitably be made. The suggested clear-glass lantern (complete with eagle finial) has actually been tested and results are recorded in Fig. A. As can be seen, a considerable portion of the generated light goes up into the sky; only a *minimum* of illumination is directed downward; and even though 22.4 per cent of the flux is emitted between 60 and 90 degrees from nadir, no wide spread of light is actually achieved. In comparing this to the distribution of the prismatically enclosed outdoor luminaire in Fig. 6, and even the diffusing enclosure, shown in Fig. 7, it becomes apparent that, although in common use, the clear-glass outdoor bracket or post lantern provides far from an ideal distribution of light.

Fig. B presents the actual, delivered footcandle results from such a luminaire, and can be compared to a similar plot of footcandles produced from a post-mounted unit 8 feet above the ground (see Fig. 13). In this case, the clear-glass lantern provides not only less than half the illumination 20 feet from the luminaire, but also only about 2 per cent as much light directly beneath and adjacent to the luminaire. This entire analysis does not point out the additional fact that the brightness of the bare, 100-watt lamp is actually presented to the eyes of the viewer, and that to hide the lamp an etched lamp chimney, often used in conjunction with such lanterns, would only reduce the output further.

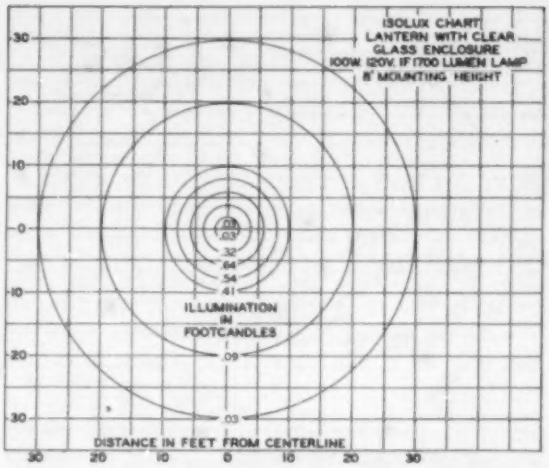


Figure B. Isolux indicating footcandles on ground, with clear-glass enclosed lantern. Sharp reduction of illumination near unit and beyond 10-foot circle.

A point raised in both discussions, and a most important one, is the consideration of brightness and glare from outdoor luminaires. These are minimized by the careful prismatic structure, which tends to make the entire luminaire surface the source, rather than the lamp alone, thereby considerably reducing the candles-per-square-inch brightness.

The prismatic structure is also such that lower wattage lamps can be used wherever desirable (in some cases, a socket position adjustment is required initially), without sacrificing the basic pattern of light or source obscuration characteristics of the refractor.

The suggestion was made that outdoor luminaires, with less emphasis on wide spread, and more light projected to the ground in the vicinity of the luminaire, would be useful.

*Author.

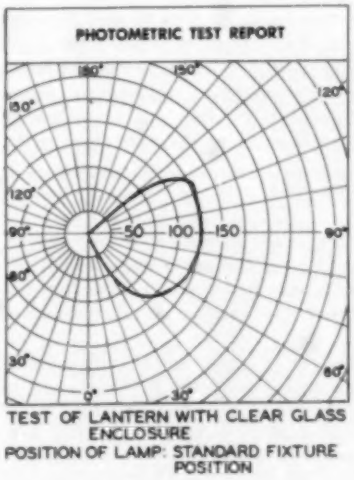
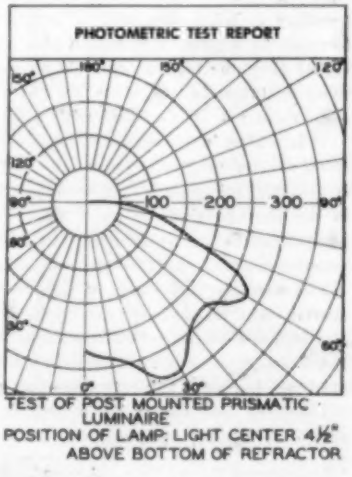


Figure A (left). Photometric distribution curve of decorative, outdoor, post-mounted lantern, with clear-glass enclosure, showing large component of light toward sky.

Figure C (right). Photometric distribution curve of prismatic, post-mounted luminaire, with light-center setting to provide maximum projection of light to ground near unit.



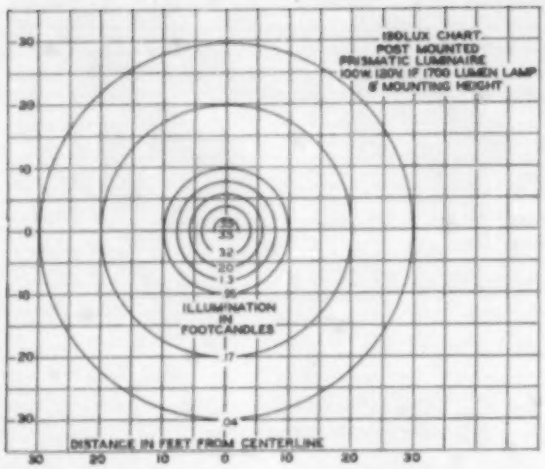


Figure D. Isolux indicating footcandles delivered from prismatic, post-mounted luminaire, set for highest lighting level on ground near unit. Average of 2.8 fc is provided out to 10 feet from 8-foot mounting height.

The prismatically enclosed post-mounted luminaire of Fig. 10, when used with a different lamp-light-center position (achieved simply by raising the socket ⅞ inch), produces the distribution pattern shown in Fig. C—with a heavy concentration of output below 60 degrees.

Expressed in terms of actual results (in Fig. D), an increase of more than 50 per cent in footcandles delivered on the ground, in the immediate vicinity of the unit, can be seen when these data are compared to Fig. 13, which represents this same luminaire, used for wide spread applications of light.

I agree with Miss Meehan that the recessed, indoor prismatic luminaire is not in any way highly decorative or mood-setting. This is purposely so, to permit the home owner to impose upon the basic lighting for seeing, provided by this kind of engineered luminaire, her own scheme of supplementary, decorative atmosphere and mood lighting. This may be done by means of luminous area elements on ceilings and walls; portable lamps; lighted flower displays and fish tanks; valances and so on.

Incidentally, colored light sources can be employed in this engineered, recessed luminaire to establish a desired mood *without* reducing the light-controlling effectiveness of the prismatic action.

Significance of Numerical Results of Photometry

(Discussion and rebuttal of a paper by E. H. Salter Published in October Illuminating Engineering)

G. A. Horton:* Since I am essentially in agreement with this paper, this discussion will be confined to the further clarification of a few points.

The author mentions such terms as accuracy of measurements, reproducibility, and repeatability of test results. In photometry, I believe that absolute accuracy should imply how closely the measurements are in accordance with the primary standard of light and the standard observer.

On the other hand, I believe that reproducibility refers to the precision with which photometric readings may be repeated under a given set of conditions. It is important to remember that because an instrument repeats itself to a high degree of precision, it does not necessarily follow that accuracy is being obtained. This requires special emphasis because the degree of precision obtainable is almost always higher than the highest possible accuracy and one is sometimes mistaken for the other. In addition, error of measurement must not be confused with tolerances.

It is stated in Knowlton's *Standard Handbook for Electrical Engineers*[1] that: "Since the unit of luminous intensity is a statistical quantity expressing the sensation produced in the average observer by a given stimulus, photoelectric measurements can never exceed in precision the accuracy of establishment of the fundamental standard."

The possibility of a unit of light reproducible from specification was studied by the various national laboratories and this led to the establishment of a technique by which the brightness of a full radiator at the freezing point of platinum is reproducible to about 0.1 per cent.

I believe that the author's remarks are, in general, directed at lighting equipment for interior use, but I can see no reason why they should not apply to street lighting. However, a few street lighting users have attempted to improve the situation by demanding the use of prefocused lamps in the product.

In aviation lighting, however, it is a different story. Customer's specifications often require the use of prefocused lamps and accurate positioning of reflecting and refracting parts so that beam angles may be accurately positioned. Both minimum and maximum candlepower values are sometimes specified and to be acceptable the photometric performance must be within these limits. In one instance, it was required that the focal length of parabolic glass reflectors be accurately measured and stamped on each reflector and an adjustable focusing gage then be used to accurately position the lamp. In other cases, it has been specified that on large orders one out of every five or ten luminaires be photometered as a quality control measure. However, performance requirements for this type of equipment are of necessity much more stringent than for other types.

1. Knowlton, A. E., "Standard Handbook for Electrical Engineers," McGraw-Hill Book Co. (New York, 1957).

T. H. Leister:* The example of spread in per cent of average for lumen output of incandescent lamps might well be remembered by those who wish to take field measurements on an installation for comparison with precalculated values.

Mr. Salter states that for assurance in duplicating photometric tests on narrow beam downlights it is necessary to keep the lamp within the lampholder from one test to another. We who must test street lighting luminaires with

*Westinghouse Electric Corp., Cleveland, Ohio.

*Line Material Industries, South Milwaukee, Wis.

TABLE A

	Light Center Normal	Light Center Shifted
Maximum candlepower	11,500 CP	9600 CP
Vertical angle at which max. CP occurs	68	71
Lateral angle at which max. CP occurs	70	79
Efficiencies		
Downward street side	54.5%	46.2%
Upward street side	1.5	1.4
Downward house side	22.4	28.2
Upward house side	1.3	1.3
Total	79.7	77.1

horizontal burning mercury lamps have agreed that the support rods of the arc chamber should lie in a vertical plane. If this is not done the candlepower distribution curves are not repeatable, but we do find that the total efficiency will stay within two per cent for various positions of the lamp.

We were rather surprised to find the spread shown in efficiencies for incandescent luminaires. It would seem that a tightening up of quality control is indicated. I would like to know if efficiencies were measured in an integrator or calculated from candlepower distribution curves, or both, in order to obtain a check. I do not believe that manufacturers of street lighting luminaires would find this spread; however, due to time consumed in running a complete photometric test, we have never done so on more than three luminaires of the same type and those tests did not vary in total efficiency by more than 3 per cent.

We can understand the spread in fluorescent luminaire efficiencies since the example of side panel transmittance is excellent.

Mr. Salter provides an example in which rounding off to two places gives what might appear to be a significant difference in two coefficients of utilization, when actually this is not true. I have an example where a number should have been rounded off and was not. Specifications for a roadway lighting installation called for a utilization efficiency of 40 per cent at a ratio of 1.0. Photometric data on the luminaire that we were proposing in our bid showed 39.9 per cent; the bid was not accepted.

Fig. 2 is a fine example of why not to judge a luminaire's efficiency from a candlepower distribution curve. This is a symmetric type of luminaire, and shows what a change in lamp position can do. To give another example of how misleading the candlepower distribution curve can be, we have a 400-watt horizontal burning mercury luminaire with an asymmetric type light distribution in which we shift the lamp ¾ of an inch toward the street side and ⅝ of an inch down in order to obtain a distribution that is appropriate for a narrower street. Table A shows that even though the magnitude of the candlepower changes by 17 to 20 per cent, total efficiency has changed only 2.6 per cent.

Photometric data has a place in making a selection for an installation, but perhaps the proposed installation's calculated photometric properties should be evaluated rather than individual luminaires. As the author states, a thought should be given to other considerations, such as "over-all luminaire quality, ruggedness, ease of maintenance."

A. W. Weeks:* The basic problem of the paper is proper and ethical use of test data. The author has given several concrete examples of test information which could be used improperly through lack of understanding or through deliberate chicanery. He points out very clearly that test data are useful and valuable, indeed they are mandatory, if progress in the subject is of any importance.

I believe this is a true evaluation of this fine paper, and it leads to an inevitable question which we as engineers must ask ourselves. I will pose that question to Mr. Salter, since he has much experience in obtaning test data, some of which has been used to advance the product involved, and some of which has been used for deliberate deception. Further, he has led in presenting the problem in the hopeful expectation of some solution. That question is: "What are we going to do to promote better understanding of test data so that they can be used properly, and only properly?"

J. S. Steinfeld:* This subject is all too frequently ignored. In our concern over "footcandles on the working plane and footlamberts in the field of view," we sometimes overlook the fact that illumination is part of the totality of architectural design, the end result of which is to create an environment for people. Occasionally, we use minimum standards and numerical computations as a substitute for good judgment and sensitivity to more intangible factors. Some of these factors are the suitability of the lighting scheme to the architect's purpose, the appearance of the luminaire, its probable maintenance characteristics, the effect of its light on the surrounding structure, and the way it fits into the whole of the interior. Perhaps for these reasons some architects allow the engineer to do only the "circuiting," and reserve for themselves the design of the lighting scheme and the choice of a luminaire, based on broad over-all considerations. The engineer, because of his myopic concern with numbers, may appear unqualified in the eyes of the architect.

The author has substantiated, in detail, the dangers in attempting to justify the choice of a particular luminaire by absolute reliance on the test data. The engineer, however, is faced with certain additional variables applicable to whichever luminaire he may choose. Reflectances, effecting the C.U., may not be known, or if known may change after the calculations are made. Maintenance factors are assumed; such assumptions can be in error by as much as 10 to 15 per cent. Supply voltage may fluctuate as much as ± 6 per cent, causing variation in the lumen output of the source. All of these application variables, taken together with the photometric test variables, may be cumulative or they may be self-canceling. At the time the application calculations are performed the engineer has no sure guide to the end result of all these variables. Is it wise, then, to base a luminaire choice on photometric data showing a preferential difference of as little as 10 per cent? Would it not be more proper to use the photometric data as a guide to create groupings of luminaires under consideration for a particular architectural design? Within this group, then, a choice could be made compatible with the design concept of the area and its use by its occupants. We could thus make an intelligent appraisal of the problem, freeing ourselves from overwhelming preoccupation with the last significant digit.

Bill F. Jones:** Mr. Salter's paper should be carefully noted by all who are concerned with the production, use, or interpretation of photometric tests. An understanding of the limitations of testing accuracy is basic to proper use of any test results. It is our hope that, as this report receives general circulation, the photometric test report will come

*Champion Lamp Works, Lynn, Mass.

*Lightolier Inc., Jersey City, N. J.
**Smoot-Holman Co., Inglewood, Calif.

into proper perspective in the selection and evaluation of luminaires.

A photometric test report rendered by a reputable independent testing laboratory assures fairness and impartiality. It does not, however, ensure accuracy. Nearly all of the reports from such laboratories fall within the accepted limits of photometric accuracy, but this is not always true.

For example, a recessed luminaire with a pebbled glass panel generally runs around 60 per cent in efficiency. One test on such a unit showed an efficiency of 73 per cent. This was obviously wrong; the unit was resubmitted, and a figure of 59 per cent was obtained. An incandescent deep bowl unit was tested by another laboratory, and an efficiency of 96 per cent was recorded. This too was rejected; retest showed 88 per cent. A test report received on a semi-indirect fluorescent unit with a louvered bottom indicated a 90 per cent efficiency. Computer calculations on this unit showed that its efficiency should be around 79 per cent at best. In fact, if the paint on the luminaire had 100 per cent reflectance, its efficiency could not have exceeded 83 per cent.

These are examples where experience on the part of the testing agency should have indicated the results were in error. Such errors are not limited to efficiencies. Units have been tested with the lens installed upside down. Also, errors are sometimes made in transcription. For example, not too long ago we received a test report on an industrial-type fluorescent unit, a conventional design which had been previously tested at least five times by this laboratory. This report showed a large "nose" on the transverse-plane curve. The report was returned, and it was found that two of the test points had been misplotted. The interesting feature of this error is that the report had been checked, passed, and signed by three of the country's most competent photometric engineers!

The foregoing does not imply that the independent laboratories are not doing a good job. These are a very few of the many reports rendered by these laboratories, and merely indicate that they, like the rest of us, are not infallible. Since they do not have unlimited time to spend on each report, nor unlimited funds to pay for the testing, it is only natural that an occasional error will slip through. Actually, it is our opinion that these laboratories have maintained extremely high standards of consistency.

The person who receives the test report, however, is not relieved thereby from the obligation to examine the report for reasonableness and consistency. In case he feels that the accuracy of the report is doubtful, he should check with the laboratory. For those of us who maintain our own laboratories, it is usually fairly easy to obtain a check against the data contained in the independent report. Use of a computer is another way to check in case a sample of the luminaire is not available. If this is not done, there is a good chance that information leading to highly erroneous conclusions may be used in design.

Inspection of reports for reasonableness and consistency has another advantage. Unfortunately, there are persons in the lighting industry who have no qualms about misrepresenting their equipment in any way possible, in order to obtain an order. One such instance involved a manufacturer who submitted a luminaire to Mr. Salter's organization. To obtain a high efficiency, he submitted a unit with little shielding. He also asked that certain angles be omitted from brightness measurement. When he received the test report, he scissored out the drawing of the luminaire, replacing it with one in which the unit was well shielded. This report was then submitted in a request for substitution on a specification. Our representative obtained a copy of this report, which we examined. It was obvious that the candlepowers obtained at certain angles were impossible in the luminaire shown in the drawing, so we returned the report to Mr. Salter, whereupon the true story came out.

Such falsification of reports is usually not performed carefully enough to fool a competent illuminating engineer; therefore, inspection of reports will help stop the practice.

A number of luminaire manufacturers maintain laboratories in which mock-ups, parts, and finished luminaires are tested. These laboratories have one advantage over the independent lab; they can usually spend as much time and energy as is necessary to ensure that the tests made therein are accurate. It is also true that, if they so desire, they can falsify a test in a consistent manner, so that detection of the falsification is extremely difficult. The reliability of a test report rendered by a luminaire manufacturer, therefore, is a function of the competence and honesty of the manufacturer's test engineer and of the company itself. With an honest, reliable manufacturer, the photometric data released will be as accurate as that obtained from an independent laboratory. In some cases it may be more so, for the reason mentioned above. If, however, the manufacturer does not enjoy this reputation for integrity and competence, the user of the data will be much better off to request a test performed by a reliable, experienced independent concern.

E. H. SALTER:* As Mr. Horton points out, there may be some confusion in terminology in the use of the words accuracy, reproducibility and repeatability in this presentation—to this I would confess. However, the general conclusion must be the same regardless of the terminology; the results of a single measurement of a single specimen must be used with due regard to the probable extent to which such a result may truly represent the product.

The problem of reporting errors will no doubt be with us as long as the reports are prepared by human beings. In reviewing a report it is very helpful to know the type of result that would be normally expected. Every effort is made to catch reporting errors, but from time to time they will slip through in spite of all precautions. There is no sure way of preventing errors of this type.

Mr. Leister, in reference to efficiency of incandescent luminaires, asks if the efficiencies were determined from candlepower distribution curves or from sphere tests. In working with incandescent luminaires, it has long been our practice to make both determinations and to require reasonable agreement between the two before accepting the measured efficiency.

Mr. Leister's example of a bid rejected, because the coefficient of utilization was 39.9 per cent where 40 per cent was specified, is an excellent example of what might be called insufficient reason for rejection. In this case, rounding off this result to the nearest percentage point would have reversed the condition.

Mr. Weeks has propounded the big question, "What are we going to do to promote better understanding of test data so that they can be used properly, and only properly?" There is, of course, nothing that can be done to prevent willful misuse of data or reports so long as there are people who will do anything in order to gain a dollar. However, a program of education, to bring to the user of these data and reports a knowledge of what their meaning is and of what information they can convey, should make it more difficult to use test data in an unjustifiable manner. It is my hope that the Society will find it practicable to spearhead this effort.

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*Author.

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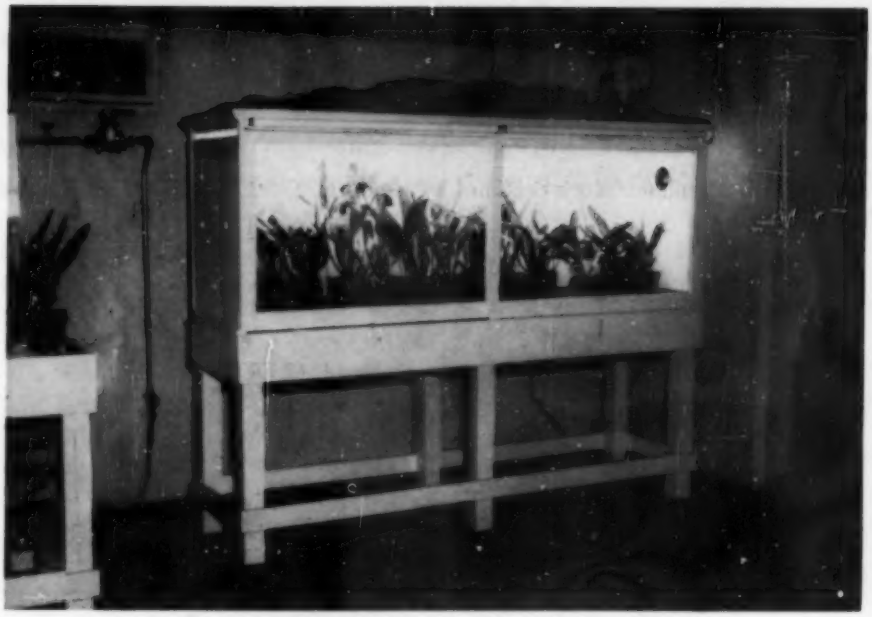

INSTALLATION AT HAROLD MILLHIZER,
2739 LINDALE N. E., CEDAR RAPIDS, IOWA.

Lighting for Orchid Growing

LIGHTING OBJECTIVE: To provide an indoor, year-round environment conducive to the growth of orchids.

GENERAL INFORMATION: Cattleya orchids, a genus of tropical American epiphytic orchids, are grown in this chamber. The chamber interior, which is painted white (80 per cent reflectance) measures approximately 2½ feet high, 2 feet wide and 8 feet long. When the orchids are not being viewed, white window shades (80 per cent reflectance) are used to cover the windows shown in the above illustration.

To maintain the proper humidity (70 per cent) and to feed the plants, the flower pots are set in 3 inches of moist gravel.

INSTALLATION: After 2000 hours' operation, eight 96-inch T-12 cool white high-output fluorescent lamps provided an average illumination level of 1200 footcandles on the gravel surface at the bottom of the growth chamber. These eight lamps are installed in 2½-inch by 1¾-inch single lamp channels mounted against the ¾-inch plywood top of the growth chamber. Four two-lamp ballasts are mounted outside on top, as is shown in the above photograph.

Lighting designed by J. Charles Young, Iowa Light and Power Co., Cedar Rapids, Iowa.

Lighting data submitted by J. Charles Young, as an illustration of a solution to a lighting problem and to aid in the design of similar installations.

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IES Sections and Chapters—Headquarters Cities

City	Section/Chapter
Albany, N. Y.	Eastern New York Section
Albuquerque, N. M.	New Mexico Chapter
Allentown, Pa.	Eastern Pennsylvania Section
Amarillo, Texas	Panhandle Chapter
Atlanta, Ga.	Georgia Section
Baltimore, Md.	Maryland Section
Birmingham, Ala.	Alabama Section
Boston, Mass.	New England Section
Bridgeport, Conn.	Housatonic Chapter
Buffalo, N. Y.	Western New York Section
Calgary, Alta.	Chinook Chapter
Charlotte, N. C.	Tar Heel Section
Chicago, Ill.	Chicago Section
Cincinnati, Ohio	Ohio Valley Section
Cleveland, Ohio	Cleveland Section
Columbus, Ohio	Buckeye Chapter
Corpus Christi, Texas	Coastal Bend Chapter
Dallas, Texas	North Texas Section
Dayton, Ohio	Miami Valley Section
Decatur, Ill.	Illini Chapter
Denver, Colo.	Rocky Mountain Section
Des Moines, Ia.	Iowa Section
Detroit, Mich.	Michigan Section
Duluth, Minn.	Twin Ports Chapter
Edmonton, Alta.	Edmonton Section
Fresno, Calif.	Yosemite Chapter
Grand Rapids, Mich.	Western Michigan Section
Greenville, S. C.	Palmetto Section
Halifax, N. S.	Bluenose Chapter
Hamilton, Ont.	Hamilton Chapter
Hartford, Conn.	Connecticut Section
Houston, Texas	San Jacinto Section
Indianapolis, Ind.	Indiana Section
Jackson, Miss.	Mississippi Chapter
Kansas City, Mo.	Heart of America Section
Little Rock, Ark.	Arkansas Chapter
London, Ont.	Forest City Chapter
Los Angeles, Calif.	Southern California Section
Lubbock, Texas	South Plains Chapter
Louisville, Ky.	Kentuckiana Chapter
Memphis, Tenn.	Mid-South Chapter
Mexico City, Mexico	Mexico Chapter
Miami, Fla.	Southeast Florida Section
Milwaukee, Wis.	Milwaukee Section
Minneapolis, Minn.	Twin City Section
Mobile, Ala.	Gulf Coast Chapter
Montreal, Que.	Montreal Section
Moncton, N. B.	Northumberland Chapter
Nashville, Tenn.	Tennessee Valley Section
Newark, N. J.	New Jersey Section
New Orleans, La.	New Orleans Section
New York, N. Y.	New York Section
Oakland, Calif.	Diablo Section
Oklahoma City, Okla.	Central Oklahoma Chapter
Omaha, Nebr.	Cornhusker Section
Orlando, Fla.	Central Florida Chapter
Ottawa, Ont.	Ottawa Section
Peoria, Ill.	Central Illinois Chapter
Philadelphia, Pa.	Philadelphia Section
Phoenix, Ariz.	Arizona Section
Pittsburgh, Pa.	Pittsburgh Section
Portland, Ore.	Oregon Section
Pueblo, Colo.	Southern Colorado Chapter
Quebec, Que.	Quebec Chapter
Regina, Sask.	Golden West Chapter
Richmond, Va.	Virginia Section
Rochester, N. Y.	Rochester Section
Sacramento, Calif.	Mother Lode Section
St. John, N. B.	Maritime Chapter
St. Louis, Mo.	St. Louis Section
St. Petersburg, Fla.	Florida Section
Salt Lake City, Utah	Utah Section
San Antonio, Texas	Alamo Section
San Bernardino, Calif.	Arrowhead Chapter
San Diego, Calif.	San Diego Section
San Francisco, Calif.	Golden Gate Section
San Jose, Calif.	San Jose Chapter
Savannah, Ga.	Coastal Empire Chapter
Seattle, Wash.	Puget Sound Section
Shreveport, La.	Ark-La-Tex Chapter
Spokane, Wash.	Inland Empire Chapter
Springfield, Mass.	Yankee Section
Springfield, Mo.	Ozark Chapter
Syracuse, N. Y.	Central New York Section
Toledo, Ohio	Northwestern Ohio Section
Toronto, Ont.	Toronto Section
Trois Rivieres, Que.	St. Maurice Valley Chapter
Tulsa, Okla.	Oil Capital Section
Valdosta, Ga.	Suwannee River Chapter
Vancouver, B. C.	British Columbia Section
Victoria, B. C.	Vancouver Island Chapter
Wichita, Kans.	Central Kansas Chapter
Washington, D. C.	Capital Section
Winnipeg, Man.	Winnipeg Chapter

In accordance with the By-laws of the Society, the General Secretary submits the following report for publication in Illuminating Engineering. Based on material recorded by Officers, Committees and Sections and Chapters, this report has been prepared with the assistance of Managing Director, A. D. Hinckley. Parts of the report were presented at the Society's Annual Meeting at the opening session of the National Technical Conference, September 12, 1960, in Pittsburgh.

The General Secretary Reports

By G. FRANKLIN DEAN

Membership

Statistics — Total membership of the Society continued to grow despite the usual losses due to resignations, dropped dues delinquents and deceased members. Totals in Table I reflect the gains and losses shown in Table II. Over-all membership growth is shown in Fig. 1. Table III records the membership by grade in the respective Sections and Chapters as well as the non-Section membership.

Fellows Emeritus, Fellows—The respective Boards recommended and Council approved elections this year of two in Emeritus status and six in Fellow grade.

Emeritus

Kasson S. Gibson—Fellow
H. H. Magdsick—Fellow

Fellows

G. B. Buck
C. A. Douglas
O. Phelps Meaker
E. B. Noel
P. F. O'Brien
R. G. Williams

Deceased — The Society records with sorrow the death of one Fellow, one MEMBER Emeritus, two MEMBERS Retired, one Associate Retired, 14 MEMBERS and 20 Associate Members during the fiscal year.

Fellow
Commery, Eugene W.

MEMBER Emeritus
Simpson, Richard E.

MEMBERS Retired
Champlin, Eri A.
Pryor, Alton L.
Weniger, Willibald

Associate Retired
Polster, H. A.

MEMBERS

Bergeson, Joseph M.
Bunnell, E. W.
Cator, F. L.
Gordon, Merritt W.
Heim, William H.
Jaqua, Charles A.
Kelly, Henry S.
Maloney, William A.
Munroe, Charles C. Jr.
Murphy, Robert J.
Talbot, Richard M. Sr.
Weber, George
White, Edward J.
Wienick, Philip P.

Associate Members

Bezzi, Carlo
Blasse, Arnold C.
Bloom, Edward A.
Bradshaw, Lavell O.
Braunschweig, A.
Buchal, Fred J.
Field, Walker
Fiene, Harry R.
Free, Lester B.
Jacobson, Hyman A.
Katsmith, J. R.
Longmate, Albert W.
Merklin, C. P.
Mullen, Earl F.

TABLE I — Membership as of September 30.

	1955	1956	1957	1958	1959	1960
Members and Fellows Emeritus	35	37	40	41	43	43
Fellows	89	99	106	113	119	121
Members	1,979	2,123	2,212	2,410	2,546	2,837
Associate Members	5,887	6,036	6,211	6,304	6,651	6,661
Student Members	188	185	157	116	128	111
Total	8,178	8,480	8,726	8,983	9,487	9,773

TABLE II — Gains and Losses in Membership During Year Ending September 30, 1960.

	Members/ Fellows Emeritus	Fellows	Members	Associate Members	Student Members	Total
October 1, 1959	43	119	2,546	6,651	128	9,487
Gains						
Elections			90	1,112	45	1,247
Reinstatements			18	65		83
Transfers	2	6	323	7	1	339
Total Gains	2	6	431	1,184	46	1,669
Losses						
Resignations			62	417	56	535
Dropped			56	412		468
Deceased	2	2	16	21		41
Transfers		2	6	324	7	339
Total Losses	2	4	140	1,174	63	1,383
Net Change		2	291	10	−17	286
Total Membership as of September 30, 1960	43	121	2,837	6,661	111	9,773

Approved by Council as a Transaction of the IES.

TABLE III — Membership of Sections and Chapters as of September 30, 1960.

	Associate Members	Members	Students	Fellows	Members Emeritus	Fellows Emeritus	Total
CANADIAN REGION							
Bluenose Chapter	29	14					43
Forest City (London) Chapter	28	8					36
Golden West Chapter	26	9					35
Hamilton, Ont., Chapter	22	10					32
Maritime Chapter	20	5	1				26
Montreal Section	86	46					132
Northumberland Chapter	27	5					32
Ottawa Section	39	17					56
Quebec Chapter	56	5	16				77
St. Maurice Valley Chapter	29	6					35
Toronto Section	164	69		6	1		240
Winnipeg Chapter	37	8					45
EAST CENTRAL REGION							
Capital Section	64	47		7		1	119
Eastern Pennsylvania Section	87	37			1		125
Maryland Section	55	26		1	1		83
Philadelphia Section	219	86		4		1	310
Pittsburgh Section	134	73	2	3			212
Virginia Section	35	31			1		67
GREAT LAKES REGION							
Buckeye Chapter	58	21	2	2			83
Central New York Section	83	42		2			127
Cleveland Section	183	125	1	28	4	5	346
Kentuckiana Chapter	31	8			1		40
Miami Valley Section	47	13	1				61
Michigan Section	177	93	3	2	3	1	279
Northwestern Ohio Section	51	15	1				67
Ohio Valley Section	50	33	1				84
Rochester Section	99	22		1			122
Western Michigan Section	50	25					75
Western New York Section	83	17	2				102
INTERMOUNTAIN REGION							
Arizona Section	78	32					110
New Mexico Chapter	46	6	2				54
Rocky Mountain Section	52	26	1	2			81
Southern Colorado Chapter	19	9		1			29
Utah Section	45	27					72
MIDWESTERN REGION							
Central Kansas Chapter	34	6					40
Central Illinois Chapter	38	14					52
Chicago Section	282	135		6	3	3	429
Cornhusker Section	73	14	1				88
Heart of America Section	63	33	12				108
Illini Chapter	22	9					31
Indiana Section	69	27	2		1		99
Iowa Section	64	26					90
Milwaukee Section	170	46	2	2			220
Ozark Chapter	18	19					37
St. Louis Section	146	39		4			189
Twin City Section	158	47		1			206
Twin Ports Chapter	36	5					41
NORTHEASTERN REGION							
Connecticut Section	70	29		2	1		102
Eastern New York Section	53	17		1	1		72
Housatonic Chapter	44	21	2		1		68
New England Section	239	97		7	2		345
New Jersey Section	134	79	1	9			223
New York Section	272	170	7	12	1	1	463
Yankee Section	36	22					58
PACIFIC NORTHWEST REGION							
British Columbia Section	64	27					91
Chinook Chapter	42	13					55
Edmonton Section	68	16					84
Inland Empire Chapter	41	16					57
Oregon Section	69	34	3		1		107
Puget Sound Section	70	37	2	1			110
Vancouver Island Chapter	18	3					21
SOUTH CENTRAL REGION							
Alabama Section	58	25					83
Arkansas Chapter	20	10					30
Gulf Coast Chapter	20	7					27
Mid-South Chapter	26	8	12				46
Mississippi Chapter	40	11					51
New Orleans Section	81	26					107
Tennessee Valley Section	28	31	1				60
SOUTHEASTERN REGION							
Central Florida Chapter	23	11					34
Coastal Empire Chapter	19	7					26
Florida Section	65	30		1		1	97
Georgia Section	87	68	1				156
Palmetto Section	52	26	1	1			80
Southeast Florida Section	90	22	16				128
Suwannee River Chapter	20	11					31
Tar Heel Section	85	52		1			138
SOUTH PACIFIC COAST REGION							
Arrowhead Chapter	44	8					52
Diablo Section	80	21	2	1	1		105
Golden Gate Section	157	53	1	1			212
Mother Lode Section	35	19		1			55
San Diego Section	74	34			2		110
San Jose Chapter	46	10	1	1			58
Southern California Section	229	99	3	5	1	1	338
Yosemite Chapter	38	13					51
SOUTHWESTERN REGION							
Alamo Section	42	8		2			52
Ark-La-Tex Chapter	30	13					43
Central Oklahoma Chapter	20	17	2				39
Coastal Bend Chapter	13	9					22
North Texas Section	126	38	3	2			169
Oil Capital Section	43	23					66
Panhandle Chapter	18	4					22
San Jacinto Section	40	29					69
South Plains Chapter	28	8					36
Mexico Chapter	29	6	1				36
Foreign Non-Section	153	63	2	1	2		221
TOTAL	6,661	2,837	111	121	29	14	9,773

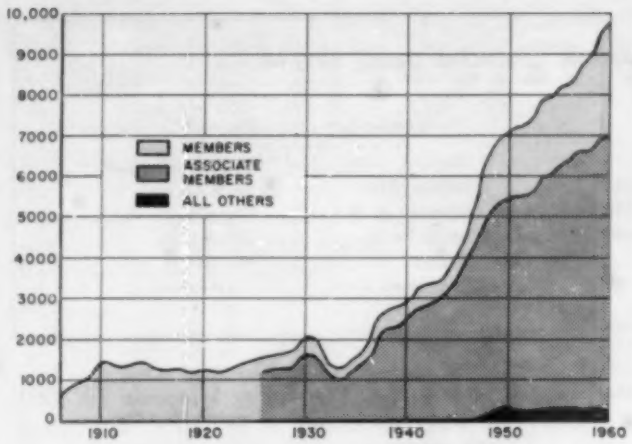


Figure 1. Growth of IES membership.

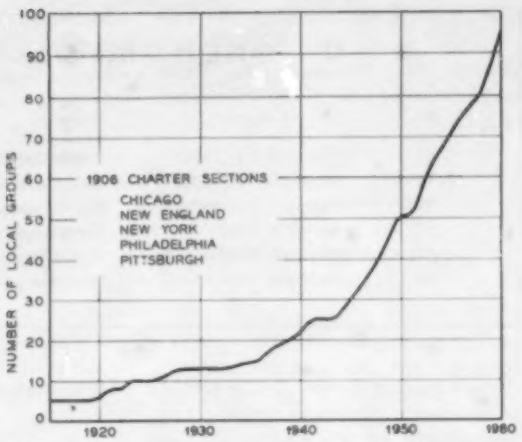


Figure 2. Society growth in Sections and Chapters.

Peterman, Frank H.	Smith, Joseph M.
Richardson, T. M.	Spry, Richard W.
Rogers, Harold R.	Smith, Fred R.

Regional Activities

Committee Program — With James R. Chambers, Vice President, as Chairman, the eleven Regional Vice Presidents on the Regional Activities Committee continued their active program of service and assistance to the Sections, Chapters and to the regional operation. All the Regions scheduled meetings of key Section/Chapter officers and chairmen for organizational planning and similar meetings in connection with Regional Conferences.

A wide range of subjects was included in the agenda of the four full-day meetings of the Regional Activities Committee, held in conjunction with the meetings of Council.

Committee Study Projects — The Regional Vice Presidents gave active consideration to eleven study projects prepared by the respective Regional Vice Presidents of which six were completed during this year. The details and actions relating to these projects are:

Project No. 2-59-60 Jobs Descriptions — Sections and Chapters — This project was completed and accepted for use by the Committee. This guide, which consists of detailed job descriptions for Section/Chapter Officers and Chairmen, was distributed to the 1960-61 Officers as soon as the election results were known. Much of the production on this was accomplished by Brooks Chassaing.

The Committee further recommended and accepted the practice, for future distribution, of spiral binding and color coding this and other guides sent from headquarters.

Project No. 3-59-60 Regional Vice Presidents' Guide—The preparation of this guide was undertaken by Brooks Chassaing and some of the preliminary material was submitted by Robert M. Taylor, 1957-58 Chairman. It is expected that this guide will be completed this year and distributed to the Committee.

Project No. 4-59-60 How To Conduct Section and Chapter Meetings—The preparation of this report was continued and it will be completed sometime during the coming year.

Project No. 5-59-60 How To Organize New Chapters—Robert W. Brown tied together a number of loose guides on this subject and came up with a completed project which greatly facilitates the work involved in setting up and developing new Chapters. The Regional Activities Committee approved this guide and recommended that it eventually be included in the Guide For Regional Vice Presidents (pending).

Project No. 6-59-60 Regional Conference Guide—Though considered excellent in form and usage and having received many favorable comments and reactions, the Regional Conference Guide was further improved and modified. Its early distribution this year should have accomplished much in facilitating the work of Regional Conference Chairmen.

Project No. 7-59-60 Lighting Course Operation — The Committee accepted R. M. Smart's completed project and complimented him on the excellence and completeness of this presentation. This project will become a part of the Section/Chapter Guide.

Project No. 8-59-60 Charter Night Declaration—This project will be continued in 1960-61.

Project No. 9-59-60 Section/Chapter Residence Lighting Forum Financing — This project will be continued in 1960-61.

Project No. 13-59-60 Study of Regional or Section/Chapter Exhibits—As a result of a report submitted by C. L. Cannon and Beverly Travis it was decided that exhibits would not be acceptable on the Regional level and would only be permitted on Section and Chapter level after submission of specific requests and approval thereof by Council.

Section and Chapter Programs — The Regional Activities Committee spent considerable time and effort in working toward a program of better coordination and interchange of ideas in regard to programs and speakers for mutual benefits of the Sections and Chapters.

The 94 Sections and Chapters of the Society continued to carry out programs of service through organization of their memberships and committees. More than 800 regular and special meetings, as indicated by reports received at Headquarters, were held during the year.

Fourteen of the Society's Sections conducted the important Residence Lighting Forums.

New Chapters and Sections — As listed in Table IV five new Chapters and one new Section were added to the

TABLE IV — New Sections/Chapters Established During 1959-60.

No.	Chartered by Council	Name	Headquarters City	Region
89	September 11, 1959	Diablo Section	Oakland, Calif.	South Pacific Coast
90	November 19, 1959	Gulf Coast Chapter	Mobile, Ala.	South Central
91	February 11, 1960	Northumberland Chapter	Moncton, N. B.	Canadian
92	March 8, 1960	Kentuckiana Chapter	Louisville, Ky.	Great Lakes
93	June 16, 1960	Illini Chapter	Decatur, Ill.	Midwestern
94	June 16, 1960	Housatonic Chapter	Bridgeport, Conn.	Northeastern

Society during the year. The number of pending Chapters indicates continued growth in the number of local groups making up the Society.

New Region—Due to the size and rapid expansion of the Midwestern Region, the Regional Activities Committee recommended that Council approve the petition for this Region to be split into the North Central Region and Midwest Region. This split was approved and these Regions will include the following Sections and Chapters in 1960-61: Midwest — Central Kansas, Cornhusker, Heart of America, Illini, Iowa, Ozark, and St. Louis. North Central—Central Illinois, Chicago, Indiana, Milwaukee, Twin City, Twin Ports.

Regional Conferences—Conferences were held in all of the Regions except the East Central, which was host to the 1960 National Technical Conference. As in recent years, the Southeastern and South Central Regions held a joint Conference, at Memphis. The record of 1960 Conferences follows, including the Chairmen of the Conference Executive Committees:

South Central—Southeastern—April 21-22—Peabody Hotel, Memphis, Tennessee, Chairman, James F. Fletcher.

Southwestern—April 25-26—Robert Driscoll Hotel, Corpus Christi, Texas, Chairman, B. L. Guess, Jr.

Inter-Mountain — April 28-29 — Mountain Chateau Hotel, Phoenix, Arizona, Chairman, Donald L. Ruff.

South Pacific Coast—May 4-6—Ambassador Hotel, Los Angeles, California, Chairman, William Shalda.

Pacific Northwest—May 9-10—Benjamin Franklin Hotel, Seattle, Washington, Chairman, G. Don King.

Midwestern—May 12-13 — Sheraton Martin Hotel, Sioux City, Iowa, Chairmen, Mark Lee and C. R. Tracy.

Statement of Income and Expense for the Year Ending September 30, 1960.

INCOME

Dues and Entrance Fees—Individual		
Fellows	$ 2,115.00	
Members	47,557.17	
Associates	99,028.76	
Students	549.50	
Entrance Fee	2,930.00	$152,180.43
Dues, Sustaining Members		64,501.80
Investments (reserve fund)		6,323.06
Sales of Publications (gross)	48,543.42	
IE Advertising	108,808.26	157,351.68
Miscellaneous Income:		
Badges & Certificates (net)	274.45	
Exchange & Miscellaneous	2,208.39	
1960 National Technical Conference (net)	1,419.11	3,901.95
TOTAL INCOME		$384,258.92

EXPENSES

General (legal, dues, medal, audit, insurance)		3,544.68
Headquarters Expense (cleaning, rent, stationery, service, electricity, miscellaneous, supplies, furniture and fixtures)		30,401.45
Headquarters Personnel (salaries, tel. & tel., postage, travel)		
Managing Director		21,995.73
Business		38,125.71
Technical		41,812.63
Publications		55,855.84
Organization (S/C., Committees, President, R. V. P., Council)		51,473.97
Headquarters Benefits (social security, pension)		10,863.12
IE Advertising (includes $2,000 survey cost)		7,449.14
Publications, Stock, Services		30,862.33
IES Lighting Handbook, 3rd Edition		
Illuminating Engineering Research Institute		20,500.00
TOTAL EXPENSES		$384,453.93
Excess of Expenses over Income		195.01
Special Activity		
IES Lighting Handbook, 3rd Edition		
Income: Sales	17,215.59	
Cost of Sales (promotions & selling expense)	12,848.65	4,366.94
BALANCE OF INCOME TRANSFERRED TO GENERAL FUND SURPLUS		$ 4,171.93

Great Lakes — May 16-17 — Carter Hotel, Cleveland, Ohio, Chairman, Russ D. Churchill.

Northeastern — June 8-9 — Wentworth-By-the-Sea Hotel, Portsmouth, New Hampshire, Chairman, Carleton M. Holden.

Canadian—June 13-14 — Nova Scotian Hotel, Halifax, Nova Scotia, Chairman, Henry Lushington.

Finance

The financial affairs of the Society continued under the supervision of the Finance Committee. Early in the fiscal year, upon his election as Treasurer, W. P. Lowell, Jr. resigned as Committee Chairman and A. C. Barr was appointed. The committee work included presentation to Council of an operating budget for 1959-60 and the review of a budget for the 1960 National Technical Conference. The committee received periodic reports from the Advisory Custodian Service of the Irving Trust Co. and consulted with the company's representative concerning the Society's reserve investment program.

The fiscal statements for the year are as given in the report of the auditor, MacNichol, Johnson & Co. These include statements of income and expense for the fiscal year, and the balance sheet as of September 30, 1960. The current audit and statements depart somewhat from those given in previous years as a result of study and recommendations of the Committee and of the Managing Director. The changes bring the official reports closer to the terms followed in monthly reports to Council and are intended to simplify and clarify the accounting records.

Constitution and Procedures

At its first meeting in the fiscal year Council referred to the Constitution and Procedures Committee, L. C. Twichell, Chairman, the review of the Society's Manual of Procedures and Policies. During the course of the year the committee corresponded with the related standing and operating committees of the Society, securing their cooperation in a review of all procedural statements so that these will be in conformance and harmony with the revised Constitution and By-laws, as well as current operation.

Illuminating Engineering Research Institute

The complete 1960 report of the Trustees of the Illuminating Engineering Research Institute was not available at the time of publication. It will appear in an early issue.

Publications

Current operation and further improvement of the Society's publications program were studied in seven Publications Committee meetings during the year, under Dr. R. M. Zabel as Chairman. Two major proposals developed from these studies were presented to Council in December, 1959 and September, 1960.

(a) At the suggestion of the editor, the Committee proposed a professional editorial survey of readers of ILLUMINATING ENGINEERING, seeking reader suggestions for greater effectiveness and readership of this publication. With Council's approval, a Compara-Rating Editorial Research was conducted during January, February and March, 1960 by John T. Fosdick Associates Inc., New York City. Details and results of this survey were reported to Council in June 1960.

(b) Stemming from a study of reader reaction to editorial material published in ILLUMINATING ENGINEERING, the Committee recommended to Council in September, 1960, publication of an additional supplement to one or more regular issues of ILLUMINATING ENGINEERING. It was suggested that such a supplement consist of Conference and other technical papers or reports having reference value but of relatively limited general interest. Purpose of the proposed supplement would be to open up the pages of ILLUMINATING ENGINEERING to more material on the application of lighting techniques and other popular editorial subjects of wide general interest.

Another study undertaken by the Committee during the year concerned a recommendation of the Advance

Comparative Balance Sheet as of September 30, 1960, and September 30, 1959.

ASSETS		September 30, 1960		September 30, 1959
General Fund				
Cash in Banks and office		$ 15,873.36		$ 32,494.56
Accounts Receivable		18,278.13		20,698.52
Inventories		15,894.32		39,591.56
Furniture and fixtures (nominal value)		1.00		1.00
Deferred charges				
Stock of Paper (IE production)		9,112.32		12,987.84
Prepaid Expenses:				
Travel Advances: Headquarters Staff		1,925.00		1,925.00
TOTAL GENERAL FUND ASSETS		$ 61,084.13		$107,698.48
Reserve Fund				
Cash in banks		7,049.45		8,229.05
Marketable Securities, at cost				
Bonds	$43,056.89		$ 25,383.76	
Preferred Stocks	60,065.00		60,065.00	
Common Stocks	70,157.66	173,279.55	56,651.18	142,099.94
TOTAL RESERVE FUND ASSETS		$180,329.00		$150,329.00
TOTAL ASSETS		$241,413.13		$258,027.48

LIABILITIES, SURPLUS AND RESERVES	September 30, 1960	September 30, 1959
General Fund		
Liabilities		
Accounts payable	851.30	8,769.64
Surplus	60,232.83	98,928.84
TOTAL GENERAL FUND LIABILITIES AND SURPLUS	61,084.13	107,698.48
RESERVE FUND BALANCE	180,329.00	150,329.00
TOTAL LIABILITIES, SURPLUS & RESERVE	$241,413.13	$258,027.48

TABLE V — Page Content of Illuminating Engineering October 1959-September 1960.

	Number of Pages Published
Conference Papers, Discussions and Abstracts	328
Technical Committee Reports	103
President's, Vice-President's and General Secretary's Reports	21
Other Technical Articles	12
Illuminating Engineering Research Institute Reports	7
Application Articles	166
Data Sheets	33
Lighting News	128
Editorials	11
Committee Personnel, Officers, Sustaining Members	37
Advertising	423
Total Pages	1269

Planning Committee to study the feasibility of two magazines, one technical and the other devoted exclusively to applied lighting. Detailed cost analyses of such a project were developed by the editor and one full-day committee meeting was devoted to discussion and study of the nature and costs of each proposed magazine. The Committee has recommended to Council that the study continue for further report in the future.

The distribution and sale of reprints and the *IES Lighting Handbook*, and advertising in ILLUMINATING ENGINEERING, were also projects of the Publications Committee, carried out at Headquarters by Clayton E. Ellis, Advertising and Promotion Manager.

Standing Committees

Six standing committees are set up by Constitutional provision and reference has been made earlier in this report to the work of three of these, Council Executive, Finance and Publications. Reports for the remaining three follow:

Board of Fellows

Willard Allphin, Chairman

The Board met in April to consider nominations for transfer to the Grade of Fellow. Prior to the meeting each member was provided with information regarding all candidates, so that the members of the Board had opportunity to study the candidates' qualifications before the meeting.

Six nominations for the Grade of Fellow were approved and recommended to Council for action at its June meeting, along with suggested citations briefly describing the contributions of the nominees.

General Board of Examiners

H. E. D'Andrade, Chairman

The Board held ten meetings at Headquarters for the approval of applications for election to Member grade, or for transfer to Emeritus or Retired membership. There was a large volume of applications, with favorable action recommended to Council by the Board in 446 cases.

Papers

Floyd Sell, Chairman

From a total of 57 proposals for papers submitted, the Committee tentatively approved 47. After reviewing the completed papers, the committee selected 37 for presentation at the Pittsburgh Conference. One invited paper was added to make a total of 38 for the program. It was necessary to continue the practice of holding parallel sessions in order to accommodate this number of papers in the time available.

General and Task Committees

The General Committees of the Society are charged with the operating functions not handled by the Standing Committees, and not pertaining to the preparation of reports on scientific and engineering subjects. The work of the Regional Activities Committee has been given in the preliminary part of this report. Reports for the balance of the General and Task Committees follow:

Advance Planning

J. D. Mitchell, Chairman

The committee held four meetings this year. Numerous subjects were discussed. Recommendations of the committee were:

(1) Recommended the commitment of future resources (manpower and money) to more effort in the area of dissemination of information on the great value and need for lighting to the electrical industry and to the general public.

a. Suggested IES slide-lecture service.

b. Suggested expanded publications program—possibly having both a colorful broad interest Society magazine and a separate technical and transaction publication.

(2) Recommended increases in the initiation fee, individual member dues, and sustaining member dues in order to meet the requirements for additional funds for increased cost of operation of Headquarters services, due to inflation, and to support worthwhile new projects, as the Council may direct, such as:

—Expanded research program
—Public Relations and Information program
—Expanded publication program
—Applied Lighting Competition.

(3) Recommended certain suggestions for National, Regional, and Section/Chapter nominating committees which would improve the Society's nominating procedure.

Allied Arts

J. D. Whitnell, Chairman

The committee continued to stimulate the interest of students at schools of architecture and engineering in lighting applications. As a result, projects were instituted in some 20 colleges and universities for the design of architectural problems with emphasis on illumination. Drawings resulting from these projects were a feature exhibit at the National Technical Conference in Pittsburgh, and Award of Merit certificates were granted to those students submitting the exhibited projects.

Applied Lighting Competition

J. C. Wilson, Chairman

The 1959-60 activity of this committee developed out of a Task Committee review of the Lighting Service Com-

mittee program of My Most Interesting Lighting Job Contests. At the November meeting Council discussed the Task Committee recommendations which included four salient points—change of name, uniform entry form, increased incentives and vigorous promotion. Following Council approval of all recommendations except an increase in budget allocation, the committee vigorously promoted and ably executed competition among the Sections and Chapters, at the nine Regional Conferences, and at the National Technical Conference in Pittsburgh. During the year the committee continued the Task Committee deliberations as to improvement of the competition and presented strong recommendations to the June Council Meeting that future budgets provide greater incentive for wider membership participation.

Board of Nomination

M. N. Waterman, Chairman

In accordance with the Constitutional provisions and following the procedure adopted by Council, the Board, consisting of three Past Presidents of the Society and representatives from each of the eleven Regions, reviewed the records of the candidates that were submitted by the respective Regional Nominating Committees. As a result of these reviews, the Board then prepared a nomination ticket that contained the names of those deemed best suited to serve as officers and directors in the positions to be filled at the ensuing election.

Defense Coordinating

J. W. Bateman, A. F. Wakefield, Co-Chairmen

This committee has been on a "stand-by basis" the last two years.

IES-USPHS, Joint Task Committee

J. F. Parsons, Chairman

The report of this Task Committee, "How to Make a Lighting Survey; A Vision Survey," was accepted as a progress report by Council in 1955. Following a survey which indicated a sufficient demand to justify publication, the draft was revised to bring it up-to-date, technically. Publication in pamphlet form and, in part, in ILLUMINATING ENGINEERING is expected early in 1961.

Lighting Service, Task Committee to Study

William P. Graham, Chairman

Early in the fiscal year Council confirmed the appointment of a Task Committee to study and report upon a broader program through which to achieve the Lighting Service Committee's objectives. The Task Committee reviewed the reports and correspondence covering the various means which could be used to further stimulate practical applications of lighting. Following the report of the Task Committee the Council Executive Committee at its July meeting reviewed the report and its final recommendation "that a new Application Lighting Data Committee be established to serve the 'definite need for a program at the National Technical and Regional Conferences to cover how, when and where the various light sources and equipment (including the new) are being applied. This would cover all kinds and types of application data in commercial, industrial and exterior lighting'." Since further clarification in the relation of the recommendations to presently available application material seemed necessary, Council Executive Committee referred the report back to the Task Committee for further study.

Medal Award

J. F. Whitehead, Jr., Chairman

The committee held one meeting in New York City and reviewed the qualifications of all candidates on file and recently submitted prior to January 1, 1960. A preliminary selection of the three best candidates was made, and following circulation of extensive biographical records the full committee arrived at a selection of Willard C. Brown of Cleveland to receive the 1960 Medal Award.

Membership

J. C. Forbes, Chairman

The 1959-60 Membership Committee was organized the same as last year. It included a representative from each Region from candidates suggested by the Regional Vice Presidents. In addition, there were several members at large appointed by the Chairman. The gain of 500 members in 1958-59 suggested that a repeat performance would produce the magic number of 10,000 members. Therefore, this quota was established for the whole Society with appropriate quotas suggested to each Section and Chapter. These were accepted as a challenge by most.

A series of contests were established using net gain figures as a basis for judging performance. The winners of the 1959-60 Membership Campaign were announced in Pittsburgh on the occasion of the National Technical Conference, as follows:

Region *vs* Region—South Central—10.3%

Section *vs* Section—Southeast Florida—36.4%

Chapter *vs* Chapter — Buckeye — 66.0%

More work was done by the Membership Committee on future planning. A memorandum was prepared and will eventually be presented to Council for its guidance. The Chairman is grateful for the support he has received from the Committee Members and Headquarters staff.

For the record, the final membership report is as follows:

Region	Winner	% Increase
Canadian	St. Maurice Valley	42.0
East Central	Maryland	3.7
Great Lakes	Buckeye	66.0
Intermountain	New Mexico	22.5
Midwestern	Twin Ports	36.8
Northeastern	New Jersey	8.0
Pacific Northwest	Chinook	19.1
South Central	Mississippi	47.1
Southeastern	Southeast Florida	36.4
South Pacific Coast	Arrowhead	21.4
Southwestern	Oil Capital	15.8

National Technical Conference

Charles L. Amick, Chairman

The invitation extended sometime ago by the Southeast Florida Section to hold the 1964 National Technical Conference in Miami Beach was accepted by the Committee, and approved by the Council in February. During the Society's 54-year history, no National Technical Conference has been held in Florida. Locations now scheduled for future conferences include: 1961, St. Louis; 1962, Dallas; 1963, Detroit; 1964, Miami Beach.

The long-range study of the scope and operation of the National Technical Conference was completed by the Task Committee, and a report on the recommendations was accepted with minor changes by Council this past June. These will ultimately be incorporated in the procedure for selecting conference locations, and in the "Guide for National Technical Conference." A new rotation plan preferred by the committee in a 1959-60 survey calls for two-thirds of the conference locations within a circle having a radius

of 550 miles from Pittsburgh, Pa. The remaining one-third would alternate among three other large areas of the United States and Canada.

Public Relations and Information

W. A. Dalrymple, Chairman

Based on the discussion in committee meetings early in the fiscal year, reports were developed outlining recommendations as to a Society program in the area of the committee's responsibility. These reports were considered at the October and November meetings of Council Executive Committee and the whole Council, and in February Council accepted the reports for study and referral to the Council Executive Committee for recommendations as to action. At the close of the fiscal year Executive Committee effort continued toward implementation of a program.

Research Financing—Task Committee on

Kirk M. Reid, Chairman

This committee was appointed by President G. J. Taylor in February, 1959. The assignment was "To determine how the long-range financial needs of the IERI research program can be met." The minutes of Council and Executive Committee meetings indicated recognition that in arriving at recommendations the committee might need to (1) re-study Sustaining Member dues and other sources of funds, and their allocation to general Society services and research, and (2) study the administrative inter-relation of the Society and IERI.

In October, 1959, President J. B. Browder re-appointed the Task Committee, since its work was well along but still far from completion.

The committee acknowledges indebtedness to several invited "consultants," who made important contributions in correspondence and in "open" portions of the Task Committee meetings.

After five meetings and extensive correspondence, the committee submitted its report to Council in June, 1960. Very briefly the principal recommendations were:

(1) An objective of $100,000 a year for research.

(2) Adequate communication between IERI and IES, including IES personnel on IERI committees.

(3) All solicitations of the lighting industry for research funds to be made by IES.

(4) Ultimately, all Sustaining Members' dues to be assigned to research.

Council accepted the report, for study and for decision as to adoption of the recommendations. The Task Committee was dissolved.

Residence Lighting Forums

Eve Freyer, Chairman

The Residence Lighting Forums of the IES (13 active, 2 inactive) 1959-60 had membership and attendance as indicated in the following table.

Forum	*Membership*	*Meetings*	*Attendance*
Arizona	no report	6	259
Atlanta	97	7	402
Capital	no report	Inactive	
Dallas	106	6	324
Michigan	112	6	964
Chicago	39	6	417
Heart of America	44	5	123
New Jersey	73	3	166
New York	121	7	568
St. Louis	77	5	221
Twin City	135	3	76
Toronto	53	2	86
Utah	no report	Inactive	
Hillcrest	26	2	76
Corpus Christi	39	7	184
Totals	911	65	3873

During this period the Golden Gate Forum (which held only one meeting in the spring of 1959) was disbanded and the Capital (Washington, D. C.) and Utah groups were inactive. Three new Forums were formed this year which have been very active in Pittsfield-Springfield (Mass.), Corpus Christi (Texas) and Newark (New Jersey). In each case the local electric utility backed the formation of the group.

Special Activities

Heart of America—The Residence Lighting Forum and IES Study Club jointly sponsored the Academy of Lighting Arts twice with 24 total meetings, 50 graduates, and a total attendance of 650.

Detroit—Designed lighting for 27 model rooms to go on display in September 1960 at J. L. Hudson Department Store.

Atlanta—For Easter, lighted a very beautiful and well-known garden on a street with considerable traffic. The lighted garden was on public display for two weeks.

Sustaining Membership

G. J. Taylor, Chairman

The committee continued in its service to the important relations between the Society and its Sustaining Members, strengthening the lines of communication and giving recognition to the financial and membership support which provides the means for expanding the Society's services to the whole membership and to the public. Locally, special effort was made to have Official Representatives and others in Sustaining Member organizations attend meetings, or have Official Representatives recognized at one special meeting. At Regional Conferences plans were to secure company support in promoting attendance, and to recognize Official Representatives at some Conference function.

The first annual luncheon honoring Sustaining Members was planned in connection with the National Technical Conference in Pittsburgh. The program featured an address by M. I. Allen, Vice President, Philadelphia Electric Co., and attracted 133 representatives of the Society's Sustaining Members. Following Mr. Allen's presentation, "Cracking the Light Barrier," questions from the audience were answered by a panel of the Society's national officers.

Anticipating final action on the Task recommendation for Research Financing, the Committee prepared to solicit for increased support for the research program. Council action on June 17 approved that all increases in Sustaining Member dues during 1960-61 be allocated to the IERI program subject to any contrary specification by individual Sustaining Members. During the final months of the fiscal year a special subcommittee for research funds began the implementation of this program.

The final membership figures for the year reflect not only the gains achieved by the Sections and Chapters, but also the losses due to resignations and dues decreases. The closing figures are shown in comparison with those for recent years.

	Members	Dues Income
1954	336	$40,635
1955	334	43,391
1956	414	63,893
1957	452	66,402
1958	448	64,815
1959	464	65,505
1960	469	64,501

Tellers

Merrill E. Welch, Chairman

As prescribed by the Society constitution, the entire committee met on May 26, 1960, and certified the number of votes cast in each area for National and Section officers. Without

the usual assistance of Headquarters personnel, the rapid tally of the correct count could not have been accomplished. A commendable job was done by the office staff in opening, collating and summarizing the ballots in preparation for the work of the committee.

Territorial and Organizational Task Committee

J. R. Chambers, Chairman

This Task Committee was appointed to meet the need for a long range study of the Society's regional structure and related organization. The Committee began by studying the Society's present regional structure and the similar geographical divisions of other engineering societies.

Trustees—Headquarters Retirement Pension Plan

Kirk M. Reid, Chairman

The Trustees of the Plan held their regular annual meeting at the time of the National Technical Conference in Pittsburgh. The operation of the Plan during the fiscal year, 1959-60, was reviewed, approved, and recorded.

United Engineering Center Task Committee

J. B. Browder, Chairman

During the fiscal year, this committee cooperated in the campaign to secure gift contributions from Society members for the United Engineering Center Building Fund. By the close of the year, 765 contributions totaling $13,382 had been made to the Center toward the Society's quota of $75,000.

Technical Committees

Aviation and Signal

M. A. Warskow, Chairman

The committee was reorganized to form one coordinating committee—the Aviation and Signal Committee—with the following three committees under its aegis:

Aircraft Lighting — Warren Hulke, Chairman

Aviation Ground Lighting — R. J. Stefany, Chairman

Signal Lighting — J. F. Angier, Chairman

The Aviation Ground Lighting Committee held a conference in March at Atlantic City, where it made an inspection of the elaborate test facilities being established at the National Aviation Facilities Experimental Center at the Atlantic City Airport. These include an extensive evaluation of visual approach and landing aids. Following the inspection, papers were presented on the various experimental visual aids installations and on the method of their evaluation. Panel discussion then followed wherein members had an opportunity to comment on and analyze the FAA program.

The group was also briefed on the air traffic control testing program underway at the airport to indicate the coordinated effort being made toward solving air traffic control and airport problems.

The "Recommended Practice for Airport Service Area Lighting," prepared by the Subcommittee on Service Area Lighting, was completed and following Council approval was published in the Society Journal.

The Aircraft Lighting Committee, after its fine start during 1959, had difficulty continuing because of personnel changes in top committee membership and a change in the economic situation for aircraft manufacturing companies on the West Coast, which reflected on membership participation. As a result, the combined Executive Committee members of the entire Aviation and Signal Committee met in May 1960 in Washington to consider whether reorganization of the committee structure should be undertaken. As a result of this meeting, it was agreed that the recommendation should be made to Council, that a single committee on aviation lighting be appointed. This would include a subcommittee on aircraft lighting and such other subcommittees covering ground lighting as the Executive Committee deems desirable. It was further recommended that the Signal Lighting Committee be re-established as an independent committee with a commitment to develop and publish principles applicable to all forms of signal lighting. Plans are now being made to proceed during 1961 on the basis of the reorganized committee.

Color

R. C. Allison, Chairman

A "Recommended Treatise for a Guide on 'Color and the Use of Color by the Illuminating Engineer'" was submitted by the committee to the Technical Office for comments. The Technical Office solicited comments from three prominent colorists and transmitted these to the committee together with its own comments. The committee is now preparing the report with revisions and additions received.

Daylighting

J. W. Griffith, Chairman

This committee held two meetings this past year. The first meeting was held at the National Technical Conference in San Francisco, and the second meeting was held in conjunction with the IERI Research Symposium in Washington, D. C.

The committee has undertaken a study to determine methods for disseminating knowledge to architects and illuminating engineers of proper use of daylighting.

A draft of the Revised "Recommended Practice of Daylighting" has been completed and submitted to Council for approval.

Education

Alston Rodgers, Chairman

Manuscript of the "Lighting Fundamentals Course" has been approved by the committee. Pertinent suggestions of committee members are being incorporated into it before final copy is submitted to Council for approval.

Final copy for the career guidance brochure for college students, "Careers in Lighting," has been completed and sent to the committee for approval.

Council has approved the formation of a "Science Textbook Review" subcommittee, under the chairmanship of J. L. Tugman, to cooperate with the Better Light Better Sight Bureau in providing an authoritative review service to assist authors and editors in preparing new textbooks or revising existing ones, and to insure that text and illustrations on light and lighting are technically correct and up-to-date.

Farm Lighting

Morris H. Lloyd, Chairman

This committee has been in touch with Dr. H. R. Blackwell on several occasions during the year 1959-60. Mr. J. P. Ditchman arranged a meeting for Mr. Crouch and Dr. Blackwell to discuss the matter of basic studies in the lighting requirements of farm tasks. Members of the Agricultural Engineering Department at Ohio State University have been brought into the discussion and they are selecting several farm tasks which will need these basic studies.

The committee held at meeting at Columbus during the recent annual meeting of the American Society of Agricultural Engineers. Mr. Crouch and Dr. Blackwell met with the committee at that time.

During the past year, Professor D. E. Wiant completed the investigation which the committee was making into regulations in effect in various states that have a bearing on farm lighting. Professor Wiant presented a report of this investigation at the 1959 Winter Meeting of the American Society of Agricultural Engineers. The paper was entitled, "Lighting Standards For the Dairy Areas in Forty-Eight States." This paper summarizes numerous state and municipal regulations that are presently in effect.

Industrial

L. G. Parks, Chairman

This committee consists of eleven members including the chairman. In addition there are six subcommittees. One subcommittee is working on a revision of the American Standard Practice for Industrial Lighting; four subcommittees are developing recommended lighting practice in the fields of men's clothing, graphic arts, outdoor production areas and the rubber industry; the remaining subcommittee (woodworking) is inactive at present.

The committee's activity during the past year included two meetings which were primarily devoted to the progress reports of subcommittees.

Good progress was made on the proposed revision of the American Standard Practice for Industrial Lighting and it is planned to present the revision in preliminary form to the ASA during the coming year.

Institutions

R. D. Bradley, Chairman

The Hospital Lighting Subcommittee reported that the bulk of the material assembled has gone into the *IES Lighting Handbook*, and that an elapse of time between this and publication of the report will permit other data to be included.

The Hotel Subcommittee has completed its assignment.

The Dining Area Subcommittee expresses the feeling that it has gone as far as possible up to this time, and that further pursuit of the task by Data Sheets would be appropriate as it should be largely pictorial.

The Church Lighting Subcommittee has been quite active and has submitted its report to Council.

Light Control and Equipment Design

J. N. Robertson, Chairman

The committee met four times during the year. Efforts were concentrated on a guide to the design of light control and on reports on plastics used in lighting.

Work on the IES Guide to Design of Light Control began in 1956. This is a comprehensive guide in four parts:

Part I—"Physical Principles"

Part II—"Design of Reflector and Optical Elements"

Part III—"Materials Used in Light Control"

Part IV—"Practical Concepts of Equipment Design"

Parts I and II have been finished, approved by Council, and published in ILLUMINATING ENGINEERING. Part III is almost ready for assembly into a preliminary manuscript. Part IV has just been started. The target date for completing the guide is late 1961.

The committee, through the IES-SPI-NEMA Joint Plastics Subcommittee, has been preparing reports on the basic material properties of plastics. Patterned after an earlier report on polystyrene, a report titled "Recommended Light Characteristics of Acrylic Used in Illumination" was submitted to Council and approved during this year. The subcommittee is now working on a similar report on vinyl.

The joint plastics subcommittee has been given the difficult assignment of writing new reports including lighting performance characteristics as well as basic material properties of plastics. Means are now being sought for establishing new methods and criteria necessary for this work.

Light Sources

H. A. Anderson, Chairman

The committee held a meeting in November, 1959. It was decided to continue collecting data for the *IES Lighting Handbook* and submit any changes in light sources data periodically on a continuing basis. Several items were submitted for future Handbook revisions.

Additional items submitted to Headquarters for the "Questions and Answers" page in ILLUMINATING ENGINEERING were published in the April, 1960 issue.

A special Task Committee is working on additional data on "The Effect of Drafts and Temperature on Starting, Light Output and Color of Fluorescent Lamps."

The subcommittee on Color Rendition under the chairmanship of Miss Dorothy Nickerson submitted a complete report on their activities with much interesting information on the problems of measuring and specific color rendition properties of light sources.

Maintenance

C. M. Holden, Chairman

The committee continued to distribute the suggested form "Maintenance Test Data of Lighting Installations" for the collection of data from a great variety of different types of installations. It is hoped that these data can be correlated for obtaining reliable information on maintenance factors in different types of installations.

Merchandising

W. H. Kahler, Chariman

One general committee meeting was held with good attendance to plan committee projects and to obtain an up-to-date report on the progress of the new Store Lighting Guide. A subcommittee was assigned the task of completing this Guide.

The Recommended Practice of Outdoor Parking Area Lighting was published in the May, 1960, issue of ILLUMINATING ENGINEERING. Reprints have been prepared with an attractive cover.

A subcommittee has been appointed to collect statistical results from lighting on merchandising. The assignment is to compile data from any reliable source for the purpose of having a "catalog" of practical results from planned store lighting installations.

Motor Vehicle (Exterior)

R. P. Teele, Chairman

The committee is cooperating with a committee of the Institute of Traffic Engineers, with the Night Visibility Subcommittee of the Highway Research Board, with the Interstate Commerce Commission, and with the National Committee on Uniform Traffic Laws and Ordinances. A lighting Study Project Report has been prepared by the chairman for submission to the committee as a first step in the possible development of specific recommendations.

Nomenclature

Sylvester K. Guth, Chairman

The committee's revision of Section

25—Light Sources, has been approved by Council and published. Section 15—Ultraviolet Radiation, which has been approved by the committee is being negotiated with Council. Section 60—Light and Vision Terms, was approved by the committee and forwarded to Council. A draft of Section 65—Lighting Application Terms, has been approved by the committee. Suggestions of the various lighting application committees are being incorporated into the draft which then will be ready for final review.

A Council controversy over the terms "luminous efficiency" and "luminous efficacy" was studied by the committee and a satisfactory compromise forwarded to Council for its approval.

The rearrangement of Z7.1 to bring it in line with current ASA practice is continuing in parallel with the revision of the various sections.

Office

Eric H. Church, Chairman

The Office Lighting Committee had several meetings during the year in which the Recommended Practice for Office Lighting was completed and presented to Council. It was then published in the June issue of ILLUMINATING ENGINEERING.

Progress

M. K. Strang, Chairman

The committee maintained contact with the art of lighting throughout the world and prepared the yearly review of the achievements in the art of lighting for publication in ILLUMINATING ENGINEERING. This review was given a dramatic presentation as one of the features of the 1960 National Technical Conference in Pittsburgh.

Quality and Quantity of Illumination, Recommendations for

John J. Neidhart, Chairman

The committee is continuing its program to develop methods of evaluating or predetermining lighting quality factors. The research programs instigated last year to provide answers to specific questions that must be resolved are continuing, and some of the data will soon be available for analysis. In response to a request for industrial lighting, suggestions were made on the possible use of comfort criteria for industrial lighting equipment. A definition of lighting quality was also drafted for submission to the Committee on Nomenclature.

Residence

W. F. Little, Chairman

The Residence Lighting Committee reports, "Lighting Keyed to Today's Homes," and the "Outline for a Training Program," have both been approved by Council. The former was published serially in three issues of ILLUMINATING ENGINEERING, beginning with October, 1960.

Roadway

Thomas J. Seburn, Chariman

Although all subcommittees of the Roadway Lighting Committee have been active during the past year, probably the work of the Committee on Revision of the American Standard Practice is most noteworthy at this time.

This subcommittee has held numerous meetings during the past year and submitted its report to the main committee at a two-day meeting held in June at Yale University. Consideration of this report occupied most of the time of a two-day session. Dr. H. Richard Blackwell appeared before the committee and presented results of his research on the visual task. The final report of the American Standard Practice Subcommittee will be delayed until later in the year.

Very closely coupled with the basic research carried on to determine lighting requirements is the work of the Traffic Safety Subcommittee. This Subcommittee is attempting to make a more objective study of the relationship of lighting and nighttime safety.

Sports and Recreational Areas

Wallace W. Weld, Chairman

During the past year there have been many inquiries on the lighting of drag strips and go-kart racing tracks. Inasmuch as these areas vary from normal race tracks, the Sports Lighting Committee has decided to study the problems presented by these new sports and will make up standard recommendations for them. They are also taking under study a recommended layout for bicycle racing.

The committee has further decided to start a research program to determine more exactly the illumination required for the various sports areas. It intends to use the Blackwell data as a basis for this work. Inasmuch as trap shooting has the fewest variables of any of the sports, it has been decided to start with this area, and using these data as a basis, apply them to the other sports areas as much as possible.

In order to cover this field to the best advantage, the committee feels it would be advisable to form two subcommittees. One of these would work on outdoor sports and the other on indoor sports.

Testing Procedures for Illumination Characteristics

Arthur W. Weeks, Chairman

Two meetings were held, each two full days, with an average attendance of 68 per cent of the thirty-two committee members. Membership represented fifteen states and one province of Canada.

Although no guides were completed during this year, sufficient progress was made on several projects to bring them close to completion.

Theatre-Television

Joel E. Rubin, Chairman

A subcommittee of the Theatre-Television group has sought ways and means of effecting the widespread adoption of the Recommended Practice for "Reporting Photometric Performance of Incandescent Filament Lighting Units Used in Theatre and Television Production."

Other subcommittees are continuing the preparation of research reports on the following: (1) Lighting for Vidicon Camera Installations; (2) Lighting for School Theatres; (3) Theatre and Television Lighting Glossary; and (4) Dimming Device Calibration.

Annual Index — Section II of January IE

The Index to 1960, to be published as Section II of the January, 1961 issue of IE, includes, in addition to subject and author indexes, business addresses of 1958-1959 and 1959-1960 IES officers and committee personnel.

Views and Opinions

A Plea for Coordination of Lighting Allies

Cooperation and coordination are badly needed between what should be allied businesses in the lighting industry. Who has not suffered the disappointment of seeing a beautiful interior, with lighting carefully planned, ruined after its first maintenance? Just as a matter of sound business economics, this waste of time, energy and money should be prevented. And it could be—with just a little coordination between those who plan and the management who maintains.

Colors for all surfaces are carefully selected, light sources scientifically placed, color of fluorescent tube thoughtfully selected. In due time, lamps lose their efficiency. Time comes for replacement. Is the right one used, per prescription? No! Whatever is in stock is used and the subtlety completely lost. Furthermore, few people think it is important, except those who spend hours developing, testing and manufacturing variations to give the best effect and the best usage.

Maintenance isn't the only field where coordination is needed. Have you ever tried to buy an R40 lamp for a home portable? One of the easiest and least expensive ways to light the average home is with portable lamps. All the lamp manufacturers developed the R40 lamp for use in these thousands of portables. Over a million dollars was spent to educate the portable lamp manufacturers to equip their lamps with harps wide enough to accommodate it. Most of them did. What happened? To this day, small, inadequate lamp bulbs sit forlornly in the center of these wide harps because nobody can find a local store that carries the R40.

Why is this? Well, two of the lamp manufacturers sell on consignment. The R40 costs more than the 75-watt lamp. Salesmen are not going to tie up their firms' money with *one* lamp when they can sell *three*. The portable lamp manufacturer equips his lamp with a harp; retail sales people are trained to recommend it; the housewife buys it equiped with an R40. Replacement, however, is almost impossible. Only top-ranking dealers stock R40's and they are not often located near informed customers. So, customers buy 75-watt lamps. Results are not as good, but there is light. If the large companies don't think in terms of ultimate consumption, why the effort in research and development?

I'm confident that hundreds of items have been designed and manufactured but failed at the distribution level. Why? Because it took cooperation and coordination to achieve success. Other companies, other industries were involved. They should have been allies, but each had his own program and couldn't or wouldn't take time to mesh a good idea, a good product, into his distribution program.

IES members could make a real contribution to better lighting if each realized and preached the coordination needed between the designer and those who maintain lighting plans or put them into effect. It is one thing to know what should be done, another to put this idea into practice.—*Gladys Miller, Editor,* New Homes Guide *and* Home Modernizing Guide *magazines, Henry Holt & Co., New York, N. Y.*

Lighting of Airport Service Areas

(Discussion and rebuttal of a paper by E. B. Karns Published in October Illuminating Engineering)

H. W. WENSON, JR.:* This subject is long overdue. I agree with the author's treatment of the various points and can only add a few random thoughts.

Increasing activity and operations while the plane is at the loading position increases the need for good illumination. Some of these activities, *e.g.*, fueling from service pits, might well require special supplementary lighting.

In the case of a loading arcade, with plane positions on each side, staggering the poles on alternate sides of the arcade and installing sufficient luminaires for two plane positions will reduce the quantity of poles.

Some of the new activities and operations being carried out have brought about a requirement for vertical illumination in excess of the horizontal illumination requirements. Consideration should therefore be given to two separate systems; a system of low-mounted luminaires to provide vertical illumination and a system of high-mounted luminaires to provide horizontal illumination. Shielding, of course, must be considered in both systems.

In addition to the methods mentioned by the author a continuous or semi-continuous row of low-mounted fluorescent floodlights, built into the building facade, provides excellent vertical illumination as well as a portion of the horizontal illumination required.

Where plans are parked in double rows, the outer row can only be illuminated by high-mounted luminaires.

Finally, the diameter of the plane position of 150 feet is not adequate for the larger planes; hence, the lighting must be designed accordingly.

T. M. LEMONS:** The IES Task Committee which prepared the "Recommended Practice for Airport Service Area Lighting" stated the criteria of this task. Mr. Karns again outlines these criteria and offers a solution to meet them. This involves the use of standard luminaires adapted to meet the criteria of this task. Luminaires, however, may lose efficiency when shielded or otherwise adapted to meet a change in the application criteria.

The arrival of the jet age has made it necessary to build or remodel many airports. This has resulted in a great interest in this task, but a recommended practice was not available as a guide until last July. Beginning two years ago, several manufacturers decided that this task merited the design of new luminaires which would fully meet its criteria. The basis which they used for this design is found in a paper entitled "Controlled Fluorescent Reflector Design for Sharp Cut-Off and Uniform Distribution."[1]

These luminaire manufacturers have found a variety of designs based on this fluorescent reflector principle. The method of applying these luminaires has also differed. Basic to all the applications of these luminaires is a mounting height of 15 to 20 feet, which is the approximate eye level of the aircraft pilot. The horizontal cutoff which is obtained from a luminaire of this design allows for the floodlighting of all surfaces below the pilot's eye level and the elimination of glare above it. The luminaire mounting height allows the architect to include them as a part of his building design and eliminates the need for 30- to 50-foot poles, associated with Mr. Karns's and other recommendations for this task.

The application of these luminaires gives special consideration to two points of the task criteria: (1) Glare is eliminated for the pilots of the aircraft and the control tower operators. (2) The architectural appearance of the building is enhanced. All other criteria of the task are met. The first installations of these luminaires have recently been completed and are now being evaluated. Perhaps next year their results will be reported at St. Louis. The initial results, however, indicate that this task is best accomplished by luminaires especially designed to meet its criteria.

1. Spencer, Domina E.: "Controlled Fluorescent Reflector Design for Sharp Cut-Off and Uniform Distribution," ILLUMINATING ENGINEERING, Vol. LIV, No. 3 (March 1959).

H. A. VAN DUSEN, JR.:* As a member of the IES Task Committee involved in the preparation of the "Recommended Practice for Airport Service Area Lighting," I concur in general with Mr. Karns's comments.

The illumination levels specified in the recommended practice can be summarized as follows:

(A) Maintained horizontal illumination of 1.0 footcandles in the service equipment parking area. This is generally a 50-foot-wide area extending out from the gate line.

(B) Maintained horizontal illumination of 0.5 footcandle over the entire service area, generally extending 200 feet or more from the gate line. Mr. Karns's paper is not clear in reference to this value.

(C) Maintained vertical illumination of 2.0 footcandles along the centerline of the service area.

These illumination levels may appear to be low. Indeed, they are generally lower than levels often recommended for similar operations performed elsewhere. They represent a compromise between the high levels that would be desirable for some of the more critical seeing tasks and a consideration that high levels of illumination can interfere with other airport operations.

It should be recalled that the aircraft pilots and the control tower operators are usually working in conditions where their seeing tasks are illuminated to very little above threshold levels during nighttime conditions. The control tower is maintained at almost total darkness, with just sufficient illumination on the instruments so that they can be seen with eyes adapted to darkness. Most of the seeing tasks of the tower operators involve detecting aircraft in dark skies and operating in the dark areas of the airport. The tower operators must maintain darkness adaption to satisfactorily perform such tasks. Likewise, the aircraft pilots maintain their cockpit illumination at minimum levels as their nighttime operations, both in the air and on the ground, involve seeing under threshold conditions.

Brightly lighted areas in the vicinity reduce the ability of pilots and control tower operators to maintain darkness adaption; therefore, it is desirable that illumination levels on the service area are not higher than is necessary. These considerations also hold for the lighting of other areas of

*Port of New York Authority, New York, N. Y.
**Sylvania Electric Products Inc., Salem, Mass.

*Line Material Industries, South Milwaukee, Wis.

the airport, especially in the vicinity of the control tower. As an example, it is not unusual for stray light from luminaires of parking areas near the tower to increase the ambient illumination level within the control tower to an undesirably high level, even though the lighted parking areas may not be within the normal viewing directions of the tower operators. It is important that all luminaires located in the general vicinity of the control tower be so directed or shielded that very little stray light is emitted toward the control tower windows. Consideration should also be given to locating the luminaires so that very little of the light reflected from wet or specular pavement surfaces reaches the control towers.

I heartily agree with Mr. Karns's comment that service area lighting often does not receive sufficient attention. At many airports the passenger must grope his way through a poorly lighted area, crowded with service vehicles, while moving between the gate and his plane. Quite often the only service area lighting consists of a few glaring spotlights arranged to illuminate a specific task, with no attention given to providing general illumination over the active area.

E. G. WOTTON:* It may be of interest to hear of some Canadian experience in the lighting of airport service areas. I agree wholeheartedly with Mr. Karns when he stresses the trouble from bright light sources in the line of sight. Unfortunately, however, I have not found it possible to use even the minimum height of 50 feet which Mr. Karns recommends to alleviate this trouble. Airport authorities appear adverse to the use of special poles to carry floodlights at that height.

It was necessary to design a floodlight (Fig. A) which can be mounted from airport buildings at a height of about 30 feet and which has an optical system in which the bright source is screened. This system uses a horizontal type 1000-watt line filament lamp before a curved glass mirror. A focusing device permits the filament to be set at the optical center of the mirror. The combination of mirror and line filament gives very accurate control of light in the vertical plane, with a sharp reduction in candlepower at angles above those containing the peak. A small light shield is then placed before the filament to screen it from the pilot's eyes.

The arrangement has proved most successful in service,

*Amalgamated Electric Corp. Ltd., Toronto, Ont.

Figure A. A floodlight designed especially for lighting airport service areas.

even with the center of the position circle 600 feet and more from the floodlight mounting position.

E. B. KARNS:* It is evident to all, I believe, that this paper is largely a commentary on the application of the recently published "IES Recommended Practice for Airport Service Area Lighting." The paper itself by no means describes all of the equipment and methods that would conform to the recommended practice. Other methods have been pointed out by some of those commenting on this paper.

In conclusion, may I say that the recommended practice, itself, is new. It is the first edition of a recommended practice for service area lighting. Due to the rapid development in the aviation industry, I feel quite sure that it will be necessary to reissue this recommended practice at least once every two years. In fact, it may be necessary to issue a supplement to this practice within the next year, due to changes that we know are coming in both equipment and services performed within the so-called service area.

*Author.

January 1 — Deadline for Gold Medal Nominations

Any Society member wishing to make a nomination for the 1961 IES Gold Medal must submit the name of his candidate, by January 1, to General Secretary J. Dixon Mitchell, at Headquarters. Candidates for the award need not be citizens of the United States or Canada, or members of the Society. Field of accomplishment may be engineering, lighting research, optics, applied illumination, ophthalmology, education, design or administration and management. The presentation of the Medal, awarded for "meritorious achievement which has conspicuously furthered the profession, art, or knowledge of illuminating engineering," will be made at the 1961 National Technical Conference in St. Louis.

LIGHTING NEWS

Surge in Street Lighting Predicted At National Conference

The prospect of a tremendous increase in street lighting modernization programs, as a result of the interest of municipal officials, electric utilities and the public, was predicted at the Second National Street and Highway Lighting Conference, held October 19 and 20 at the Ambassador Hotel in Chicago. Edmond C. Powers, educational director of the Street and Highway Safety Lighting Bureau, in a speech before the Conference, stated that "It is apparent from the speeches of municipal and electric utility officials at this Conference that the stage is set for a tremendous upsurge in the lighting of the nation's streets." He predicted that more progress in street lighting modernization would be made during the next seven months than during any comparable historical period.

Active interest of members of the General Federation of Women's Clubs in modern street lighting was reported to the Conference by Mrs. Dexter O. Arnold, first vice president of the 10,000,000-member Federation. Mrs. Arnold emphasized that Federation clubwomen are being urged by their national organization to seek adequate street lighting in their home communities as the best possible protection against criminal assaults and traffic accidents.

The Street and Highway Lighting Conference, jointly sponsored by the Edison Electric Institute and the National Electrical Manufacturers Association, was a gathering of representatives of public utilities, manufacturers, consulting engineers, municipal and urban redevelopment officials. Proceedings and conference speeches, soon to be available in printed form, may be obtained from Street and Highway Safety Lighting Bureau, Department SLC, 55 Public Square, Cleveland, Ohio.

USNC-CIE Elects Officers

At its annual meeting at State College, Pa., October 17 and 18, the United States National Committee of CIE (International Commission on Illumination) re-elected its officers to an additional term. These are: President, Willard C. Brown; Vice President, Everett M. Strong, Cornell University; Secretary, L. E. Barbrow, National Bureau of Standards; Treasurer, T. D. Wakefield, The Wakefield Company.

Three additional members were added to the Executive Committee: H. L. Logan, Holophane Company Inc., W. B. Lowell, Jr., Sylvania Electric Products Inc., and R. C. Putnam, Case Institute of Technology.

1960 U. S. Power Production To Reach 175.9 Million KW

The generating capacity of the United States electric power industry is being increased by 12.6 million kilowatts during 1960 for a total production of 175.9 million kilowatts by the end of the year. This information was reported in the 28th Semi-Annual Power Survey of the Edison Electric Institute, released on November 4, 1960.

The 7.7 per cent increase in capability over December, 1959 is part of a long-range program of an annual average expansion of over 7 per cent, aiming toward 211 million kilowatts by the end of 1963.

Forecasts indicated that the December, 1960 peak load for the entire electric utility industry would be 137 million kilowatts, 9.4 per cent increase over the December, 1959 peak load. Projected peak for December, 1963, 169 million kilowatts, represents an average annual increase of 7.6 per cent.

The EEI Power Survey, made semi-annually since 1947, includes forecasts of peak power demands and supply capabilities on a regional and national basis, as

SECTION status is conferred upon Mother Lode Chapter in Sacramento, Calif., as 1959-60 South Pacific Coast Regional Vice President, James Barnes (right in photo at left), presents new charter to 1959-60 Mother Lode Chairman, Earl Storrs. In photo at right, 1960-61 Regional Vice President, Roy Kreyser (standing, left), installs new Section Chairman, Elton Harris. Seated, l. to r.: Mrs. Kreyser, Mrs. Storrs, Mr. and Mrs. Barnes.

Here and There with IES Members

Civic-minded Capital Section members, Al Fox (photo at left) and Al Rugo (at right), were guest lecturers during a special summer term of classes conducted for students with particular interest or aptitude in science at Montgomery County, Maryland, junior high schools. Their lectures on lighting included discussion and demonstration of lamps, parts and models; an analysis of how lighting units are engineered; use of light sources in engineered equipment and colored slides showing the application of good lighting in the Washington area.

Guest speaker, Richard Dulude of Corning Glass Works (left), is presented with golden trophy of the "ever-burning lamp of knowledge" as a memento of his talk before the Western New York Section. Making the presentation is Chairman Ed Cunningham. Mr. Dulude's discussion of "Glass for the Lighting Industry" was the opening program for the 1960-61 year.

Planning for 1961 Southwestern Regional Conference, April 16-18 at the Skirvin Hotel, Oklahoma City, are members of Conference Executive Committee (left) and Ladies Committee. L. to r., photo at left: Dale Hampton, program; Lloyd Boyles, finance; Paul Sheline, general conference chairman; W. S. Irving, entertainment. Getting ready for the ladies, l. to r.: Marguerite Borelli, Mrs. Lloyd Boyles, Mrs. W. S. Irving, Mrs. Paul Sheline.

well as data on production of heavy electric power equipment. The survey is prepared in cooperation with operators of power systems throughout the United States and the principal manufacturers of turbine-generators, boilers, transformers and other heavy power equipment.

Nation-wide Relighting Program Launched at NECA Convention

A nation-wide market expansion program for modern relighting of commercial and industrial facilities was announced by Graybar Electric Co. during the National Electrical Contractors Association Convention in Las Vegas, October 23-27. The first such program ever to be undertaken by a wholesaler in the electrical industry, this plan represents a break with the traditional concepts of the role and functions of marketing.

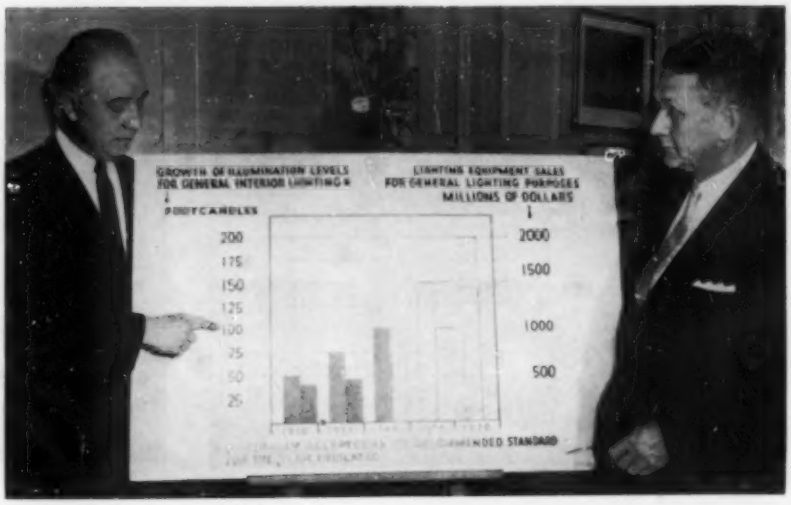
Lighting Action Plan, as the program is called, has already received the active support and participation of more than 200 electric utility companies, 12 fixture manufacturers, a lamp manufacturer and many electrical contractors (who will be the primary users of the program), according to the Graybar announcement.

In introducing the program at the NECA Convention, B. F. Benning, general lamp and lighting sales manager for Graybar, stated that the relighting market represents a potential five million-dollar-business. With related product markets (*e.g.*, wiring) of approximately twice that amount, according to Mr. Benning, the relighting field is one of the most dynamic markets in the electrical industry. Locally, for the electrical contractor, the potential for fixture sales should amount to one million dollars in relighting for every 25,000 people.

The new program is based upon the need for improving lighting levels in older (pre-1950) commercial and industrial facilities. Post-1950 construction, incorporating the techniques for producing higher lighting levels, has spurred interest in relighting older facilities, according to Mr. Benning.

The Lighting Action Program is expected to provide contractors with a complete package of training and selling aids concerning fixtures, lighting requirements and markets. Also included in the package are a specially-designed light meter with rotary dial showing minimum recommended lighting levels for a variety of areas and a simplified lamp and lighting guide to facilitate rapid understanding of the lighting needs in any given amount of space.

The training program will be conducted by the sales forces of Graybar and the participating manufacturers and utilities.



COMPARATIVE rise in lighting levels and sale of electrical equipment from 1950 projected to 1970 are demonstrated with the aid of a bar graph shown by B. F. Benning (left), general lamp and lighting sales manager of Graybar Electric Co., to W. E. Henges, Graybar president. The statistics in the graph were, in large measure, responsible for Graybar's recently-launched nation-wide lighting modernization program, announced by Mr. Benning at the National Electrical Contractors Association Convention in Las Vegas.

Industrial Lighting Clinic Equipment Show, 600 Attend

Over 600 architects, engineers and plant managers attended an Industrial Lighting Clinic in New York City, October 25 and 26. The two-day meeting was sponsored by Consolidated Edison Co.

Featured as speakers were three authorities on industrial lighting: E. A. Linsday of General Electric Co., Cleveland, Ohio: Marshall N. Waterman, Westinghouse Lamp Division, Bloomfield, N. J., a past-president of IES; and George W. Clark, Sylvania Electric Products Inc., Wheeling, W. Va.

Fourteen manufacturers of industrial lighting equipment cooperated with Con Edison in presenting lighting demonstrations and manufacturers' displays and exhibits. All of the demonstrations were keyed to modern current-recommended-level-installations.

A valuable part of the clinic for plant managers and engineers was the "Answer Man" installed at a special table throughout both days of the meeting, and 15 Con Edison men assigned to discuss lighting problems of any nature. This feature permitted personal contact for specific questions and discussions and personal attention to individual problems.

The Clinic was held in the Con Edison

LIGHTING clinic in New York presented latest methods and equipment on industrial lighting for 600 plant managers and engineers. Chief "educators" above, left to right, E. A. Linsday, M. N. Waterman and G. W. Clark. Photo at right, part of the large crowd viewing the lighting demonstrations. Clinic was sponsored by Con Edison.

IES Hi-Jinks

When interest sags, meeting attendance declines, some old-fashiond hi-jinks may provide the needed lift at Section/Chapter meetings. Some practitioners of the art (photo at left, above), Arne Oja and Bill Vahl of the Iowa Section, portray bumbling electricians in a unique introduction to a talk on ballasts by Fred Abrahams of Advance Transformer Co., Chicago. Photo at right, above, another Iowa Section venture, "Round-Up Time in Des Moines," starring Lou Kingsley, Arne Oja, Mel Dietz. This skit was a publicity stunt for the theme of the Section's spring meeting in Des Moines — "every member bring a member." In photo at right, the nominating committee of the Western New York Section "railroads" officers for the 1960-61 year. Left to right: brakeman, Silvio Fillipetti, nominating committee; engineer, Bob Herget, board of managers; switchman, Ed Cunningham, section chairman; fireman, Bill McCarthy, board of managers; conductor, Bill Guminski, nominating committee.

office building in New York, with Harold Peters as Chairman. Guests were served a buffet supper and in the evening had a tour of the company's relighted offices.

NBS Appoints Two New Technical Advisory Groups

The National Bureau of Standards, U. S. Department of Commerce, has announced the establishment of two new Technical Advisory Committees, one concerned with calibration and measurement services, the other with engineering and related standards.

The committees, composed of leaders in specialized fields recruited from industry, will aid the Bureau in cooperating with industry in the fields of precision measurement, calibration and standard practices. William Wildhack, special assistant to the director of the National Bureau of Standards, will serve as chairman of both committees.

These two new committees were appointed in addition to a group of technical advisory panels drawn from scientific and engineering societies who advise various technical divisions of the Bureau. The panels, whose activities are coordinated by the National Academy of Sciences, National Research Council, help to keep the Bureau informed of the needs of the nation's scientific and technological communities.

Decorators Showroom To Open in New York

Growth of the decorating and furniture industries has spurred the construction of a new decorators' showroom on East 62nd Street in New York City. To be known as the Decorators Center Building, the project is expected to be ready for occupancy by January 1. Some 60,000 square feet of the new Center will feature display of equipment, special exhibitions and a permanent information booth.

No Speed Limit on Dream Highway Lighted to 3 Footcandles

Report on a Dutch highway lighted to an average of three footcandles maintained over its entire length was presented at the annual meeting of the United States National Committee of CIE (International Commission on Illumination), held October 17 and 18 at the Nittany Lion Inn, State College, Pa. The installation, on a new four-lane divided highway between Rotterdam and The Hague, provides at least three times more light than the best comparable United States installation.

Sodium lamps mounted four per pole on 40-foot standards in the center dividing strip supply the illumination on the highway. The system delivers some 85,000 lumens per pole compared with the U. S. practice of 20,000 lumens per pole. The highway has no speed limit.

John W. Young, consulting engineer of Boston, Mass., reported this installation to the United States National Com-

mittee. Mr. Young, who is chairman of the street lighting committee of the USNC and United States "expert" on the international "working party" of CIE, had just returned from a trip to Europe during which he had observed this Dutch installation.

Ontario Library Sponsors Display Of Christmas Lighting Techniques

Members of the Toronto Residence Lighting Forum are responsible for a novel display at the North York Public Library in Willowdale, Ontario—the do's and don'ts of decorative Christmas lighting. The exhibit, sponsored by the library in the hope of raising the level of taste in Christmas decorating, demonstrates effective and economical lighting techniques applicable to indoor and outdoor home decorations. As a precautionary measure, the exhibit also includes examples of improper lighting techniques.

Another section of the exhibit, devoted to commercial and industrial display, illustrates the superiority of an artistic approach to a garish one.

This joint venture of the Toronto Forum and the library resulted from a Forum meeting held in the library which included a discussion of the lack of discrimination in Christmas displays.

Symbol Withdrawn from 1961 National Electrical Week Campaign

The animated figure of electricity standing on a hand and encircled by the slogan "Make Electricity Work for You," originally intended as the symbol for the 1961 celebration of National Electrical Week, has been abandoned. Due to a confusing similarity between this design and the trade symbol of Reddy Kilowatt, Inc., the National Electrical Week Committee has requested that the logo, which appears in the NEW Planning Guide, not be reproduced in any campaign publicity.

Notice of this policy has already been sent to trade associations and all other organizations engaged in the distribution of the Planning Guide. In addition, the Committee asks that reproduction sheets incorporating the symbol be destroyed.

Engineering Exhibits Planned For United Engineering Center

An exhibition area for displays reflecting the origin, growth and achievements of engineering is being planned as an important public-service feature of the new United Engineering Center. The space is being designed to accommodate 10 to 12 displays devoted to the various engineering fields. Regular changes in

(*Continued on page 14A*)

SCHEDULED EVENTS

1961 Dates of Interest to IES Members

JANUARY

January 19-21—International Sign Association, Fourth Annual Convention, Penn-Sheraton Hotel, Pittsburgh, Pa.

January 23-26—Plant Maintenance and Engineering Show, International Amphitheatre, Chicago, Ill.

January 24-27—Society of Plastics Engineers, Inc., 17th Annual Technical Conference, Shoreham and Park Sheraton Hotels, Washington, D. C.

January 29-February 3—Winter General Meeting, AIEE, Hotel Statler, New York, N. Y.

FEBRUARY

February 5-11—National Electrical Week

February 7—National Electrical Week Luncheon, Sheraton-Astor Hotel, New York, N. Y.

February 9—IES Council Meeting, Barbizon Plaza Hotel, New York, N. Y. Members are invited to attend meetings of Council as guests.

February 13-16—American Society of Heating, Refrigerating and Air Conditioning Engineers, Semi-Annual Meeting, Conrad Hilton Hotel, Chicago, Ill.

February 19-22—National Electric Sign Association Convention, Benjamin Franklin Hotel, Philadelphia, Pa.

MARCH

March 2-4—Optical Society of America, Roosevelt Hotel, Pittsburgh, Pa.

March 5-8—Third National Lighting Exposition and World Lighting Forum, New York City Coliseum, New York, N. Y.

March 20-23—Edison Electric Institute, Annual Sales Conference, Edgewater Beach Hotel, Chicago, Ill.

March 21-23—American Power Conference sponsored by Illinois Institute of Technology, Sherman Hotel, Chicago, Ill.

APRIL

April 8-15—Electrical Home Show, War Memorial Building, Rochester, N. Y.

April 10-11—East Central Regional Conference, IES, Benjamin Franklin Hotel, Philadelphia, Pa.

April 17-18—Southwestern Regional Conference, IES, Skirvin Hotel, Oklahoma City, Okla.

April 20-21—Southeastern/South Central Regional Conference, IES, Biltmore Hotel, Atlanta, Ga.

April 23-28—American Institute of Architects, Annual Convention, Philadelphia, Pa.

April 29-May 3—National Association of Electrical Distributors, Annual Convention, Detroit, Mich.

April 30-May 4—Electrochemical Society Meeting, Claypool Hotel, Indianapolis, Ind.

MAY

May 1-2—Intermountain Regional Conference, IES, Salt Lake City, Utah.

May 4-5—South Pacific Coast Regional Conference, IES, Sacramento Inn, Sacramento, Calif.

May 8-9—Pacific Northwest Regional Conference, IES, Harrison Hot Springs, Harrison, B. C., Canada.

May 15-16—Canadian Regional Conference, IES, Queen Elizabeth Hotel, Montreal, Que.

JUNE

June 5-7—Edison Electric Institute, Annual Convention, New York, N. Y.

June 5-9—Society of the Plastics Industry, National Conference, Commodore Hotel, New York, N. Y.

June 7—IES Council Meeting, Barbizon Plaza Hotel, New York, N. Y. Members are invited to attend meetings of Council as guests.

June 8-9—Northeastern Regional Conference, IES, Berkeley-Carteret Hotel, Asbury Park, N. J.

June 18-23—AIEE Summer General Meeting, Ithaca, N. Y.

June 19-20—Great Lakes Regional Conference, IES, Sheraton-Gibson Hotel, Cincinnati, Ohio.

June 23-28—American Society of Heating and Air Conditioning Engineers Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

JULY

July 5-8—National Society of Professional Engineers, Annual Meeting, Olympus Hotel, Seattle, Wash.

July 18-20—Western Plant Maintenance Show, Pan Pacific Auditorium, Los Angeles, Calif.

SEPTEMBER

September 14-15—Engineering Management Meeting, Sponsored by AIEE and ASME, Hotel Roosevelt, New York, N. Y.

September 24-29—Illuminating Engineering Society, National Technical Conference, Chase-Park Plaza Hotel, St. Louis, Mo.

OCTOBER

October 4-6—Canadian Electrical Manufacturers Association, Annual Meeting, Sheraton-Brock Hotel, Niagara Falls, Ont., Canada.

October 4-6—International Association of Electrical Leagues, Annual Conference, President Hotel, Atlantic City, N. J.

October 9-14—National Electrical Contractors Association, Annual Convention, Washington, D. C.

October 15-20—AIEE Fall General Meeting, Detroit, Mich.

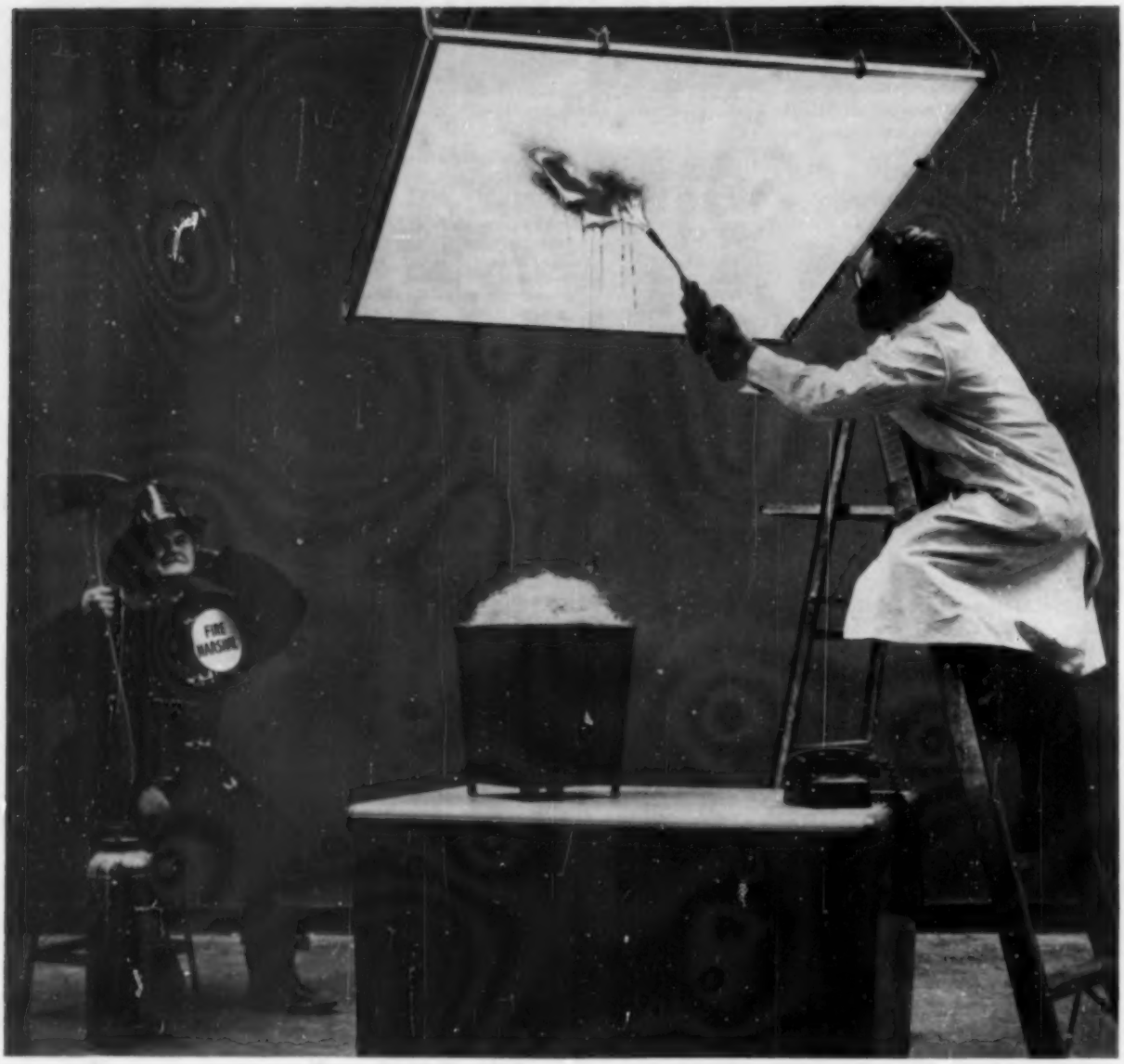
Send for Your Entry Form Now

Entry forms for the 1961 IES Applied Lighting Competition are available at Headquarters. Send request to John K. Michel, Membership Secretary, Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y.

Sheffield announces FIRST

Self-Extinguishing †

Impact-Styrene Sheet



† New FROST-WHITE-SE* grade sheet is guaranteed to puzzle even the most knowledgeable fire marshal. No heroic countermeasures are required either, since melted, flaming particles extinguish themselves long before reaching any flammable materials below.

*Trade Mark. Sheffield Plastics, Inc.

New FROST-WHITE-SE Styrene Sheet Overcomes Major Problems of All-Plastic Ceilings

Now you can take advantage of the superior performance of vacuum-formed styrene sheet or pans for installations where the plastic covers most of the ceiling. Sheffield Plastics' new FROST-WHITE-SE styrene sheet not only meets the N. Y. C. building code self-extinguishing requirements, but overcomes the problems of premature discoloration and lack of rigidity of vinyl sheet now so widely used. Its characteristics include:

- ***SELF EXTINGUISHING*** — Passes N. Y. C. Building Code, Group A, Underwriters' Test Lab, Group 2 and ASTM Test D-568-56T, can thus be used in all-plastic ceiling installations.
- ***COLOR STABLE*** — Retains its original blue-white color up to 50,000 lighting hours — more than 2 times as long as vinyl sheet or pans.
- ***BREAK RESISTANT*** — Withstands severe impact and can be twisted as much as 180° without breaking. Cuts breakage in handling and shipping.
- ***EFFICIENT*** — Has high light transmission (up to 60%) in sheet thickness of 0.025". Increased thickness, compared to 0.015 or 0.020" thick vinyl sheet simplifies handling and installation.

Test of regular styrene at left vs. new FROST-WHITE-SE styrene at right using method similar to A.S.T.M. method D-568-56T. Note flaming vs. self-extinguished styrene particles around clock in photos 2 and 3.

NOW AVAILABLE in volume production, FROST-WHITE-SE styrene sheet is readily processed by vacuum formers in shapes to meet your installation requirements. Sheffield, of course, produces only the sheet in thicknesses of 0.025 and 0.040 inches.

TECHNICAL DATA AND PRICES OF FROST-WHITE-SE styrene sheet are readily available. Address your requests to the nearest Sheffield sales office or to Sheffield Plastics, Inc., Dept. 04-B, Sheffield, Massachusetts.

First in Plastics for Lighting

SHEFFIELD PLASTICS, INC.

SHEFFIELD, MASS.

SALES OFFICES

New York, N. Y. LO 8-3760 • Drexel Hill, Philadelphia MA 6-4762

Chicago, Bill Brown Sales Co., Inc. IR 8-8980 • San Francisco, Courtney Associates JU 5-5010

(Continued from page 11A)

exhibits will be made to keep the display timely and give coverage to ideas from the various engineering disciplines.

H. Karl Honaman, recently retired as director of publications for the Bell Telephone Laboratories, Inc., is chairman of the committee appointed to plan for the exhibit space.

The United Engineering Center, future home of 18 engineering societies including IES, is now under construction on United Nations Plaza in New York City. It is expected to be ready for occupancy by September, 1961.

3 Consulting Firms Join To Plan 1964 World's Fair

Three leading consulting organizations, Vandeburg-Linkletter Associates, Inc., Ebasco Services Inc., and Walter Kidde Constructors, Inc., have joined forces in V-E-K Associates, Inc., to provide complete services and facilities for exhibitors in the 1964-65 New York World's Fair. The new organization, which pools the three firms' experience in exposition planning and management, design and construction, will handle all aspects of the Fair planning from initial conception, design and construction to the actual management of exhibits and programming of shows and special events.

Vandeburg-Linkletter Associates is an exposition planning and public-relations organization; Ebasco Services has specialized in management consulting and construction; Walter Kidde Constructors have had over 50 years' experience in industrial planning and construction.

ABOUT PEOPLE

(M) denotes Member grade in the Society; (A) signifies an Associate Member.

The Society of Plastics Engineers has elected **Frank W. Reynolds** as president for 1961. Mr. Reynolds is manager of the IBM Plastics Laboratory, Endicott, N. Y.

Don P. Caverly (M) has been named president, general manager and director of the Barth Engineering and Manufacturing Co., Meriden, Conn., effective November 1. Barth develops industrial equipment for missile handling, railroad safety devices, and electronic gear for the compilation of high-altitude weather data. Mr. Caverly was formerly associated with Sylvania Electric Products Inc., Salem, Mass.

The appointment of **Dr. George M. Anderson** as president of the Thomas A. Edison Research Laboratories of the McGraw-Edison Co. has been announced by Alfred Bersted, president of the company. The laboratories, in West Orange, N. J., are the firm's research headquarters.

The Contractors Medal and Purse, provided for under the James H. McGraw Award for Electrical Men, was conferred upon **Denis J. Crimmins,** manager of the New York City Chapter of the National Electrical Contractors Association. Mr. Crimmins, who received his award at the October general meeting of the NECA in Las Vegas, was honored for leadership in applying a new charter to increase NECA's membership in large cities.

Dr. G. W. Wyszecki, head of the Radiation Optics Section of the National Research Council of Canada, was elected president of the Canadian National Committee on Illumination at the Committee's fifth annual meeting in October. New secretary is **Dr. C. L. Sanders** of the NRC's Applied Physics Division. Dr. Wyszecki succeeds **Dr. W. E. K. Middleton,** also of NRC, as president of the Committee, which is affiliated with the International Commission on Illumination.

The purchase of the Wide-Lite Corp., Houston manufacturers of floodlighting equipment, by Esquire, Inc., publishers of *Esquire* and *Coronet* magazines, has been announced by **W. F. Wilson,** president of

(Continued on page 18A)

Questions & Answers on Light Sources

The IES Light Sources Committee under the chairmanship of Herbert A. Anderson has prepared these answers to questions concerning light sources. Readers are invited to submit similar questions of general interest to be considered for publication. Questions should be sent to the Light Sources Committee, care of IES Headquarters.

Question: What are the facts concerning "seeability" under the different color lamps, green particularly?

Answer: Tests have shown no improvement in "seeability" in reading black and white printing under color-tinted lamps *vs* white lamps with lighting levels generally used. Psychological rather than technical factors should govern the application of such lamps.

Monochromatic light, as distinguished from the light from tinted lamps which is not monochromatic, will produce less chromatic aberration, resulting in a somewhat sharper visual image. Because of this, laboratory tests have shown that monochromatic light can very slightly improve the "seeability" of tasks consisting of fine detail, but for ordinary tasks there is no practical advantage.

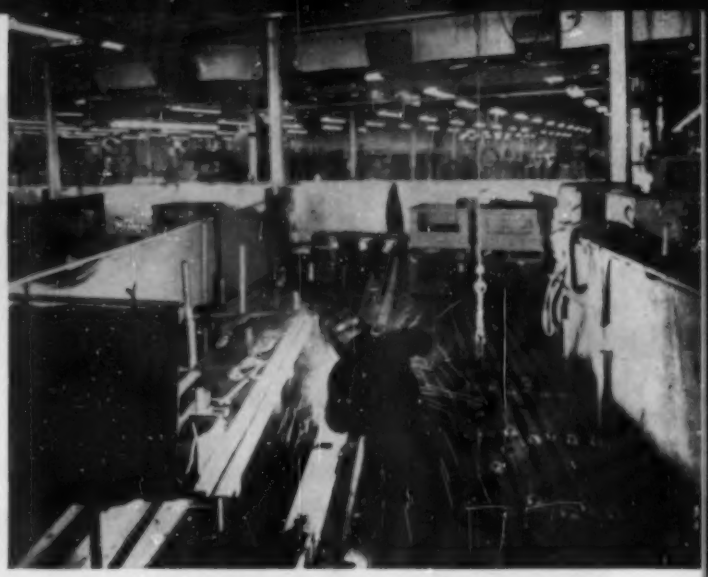
Monochromatic light is of no value for seeing where color discrimination is important. Tinted light distorts the color appearance of objects and can lead to incorrect color judgments. White light is preferable for most seeing tasks.

Question: Will the mounting of a fluorescent luminaire on a flammable acoustic tile ceiling cause short ballast life as a result of overheating? Is there a possibility of fire as a result of this type of application?

Answer: Ballasts do not necessarily operate at excessive temperatures when applied in luminaires that are mounted on flammable acoustic ceilings. However, this depends upon the particular luminaire design, ballasts used and other application factors. The life expectancy of a ballast is dependent upon its operating temperature regardless of the type of ceiling the luminaire is mounted on. Under unfavorable heat dissipation conditions adjacent flammable material could be ignited due to temperatures produced by the luminaire.

The National Electrical Code and the Canadian Electrical Code have modified their luminaire mounting requirements so that any unit mounted on a *flammable* ceiling material must be spaced 1½ inches away from the ceiling material itself. There are, however, a good many ceiling materials, including acoustic tile, that are not *flammable* and, as a result, fluorescent luminaires can be mounted on such material, although ample provision should be made for heat dissipation from any lighting unit.

Efficient methods mean orderly, accurate assembly. Here, overhead conveyor moves luminaires in our spacious plant.



Manufacture of hinged poles — these and other products flow quickly through production system for on-time delivery.

What makes Revere the consultant's choice for outdoor lighting?

Revere builds lighting equipment to outlast even the user's expectations

How long do your clients expect their outdoor lighting equipment to last? *Most* users expect the equipment they invest in to last at least as long as the application. It seldom does. Realistic consulting electrical engineers know that in outdoor lighting, as in most other things, you get exactly what you pay for in terms of engineered light output and in equipment durability.

Revere people know this too. That's why it's company policy to build up to a quality level, never down to a price level. The slight price premium sometimes commanded by Revere products is invested by the factory in manufacturing and design refinements which assure a generous return in terms of premium performance and durability. The result is reliability you don't often see, and added years of service you don't usually expect.

Just as the lighting specifier can select exactly the right equipment for any application from Revere's wide line, so can Revere utilize all the resources of a large, modern plant to select the best manufacturing method for each product. When you specify Revere your clients get all the light they're paying for, delivered where they want it, in fixtures designed and made to outlast even the user's expectations.

Write for your copy of Revere's comprehensive outdoor lighting catalog. Or see your Revere sales engineer for prompt answers to your questions on how our standard line or custom design service can serve your needs.

Revere ELECTRIC MFG. CO.

OUTDOOR LIGHTING

Revere Electric Mfg. Co. • 7420 Lehigh Avenue • Chicago 48, Illinois (In suburban Niles)
Long Distance Phone: NIles 7-6060 • Chicago Phone: SPring 4-1200 • Telegrams: WUX Niles
In Canada: Curtis Lighting, Ltd., Leaside, Toronto, Ontario

Components such as this spun aluminum reflector are carefully fabricated to exceed application requirements.

Electrostatic spray painting produces a smooth, consistent, long-lasting prime coat on Revere poles and sub-assemblies.

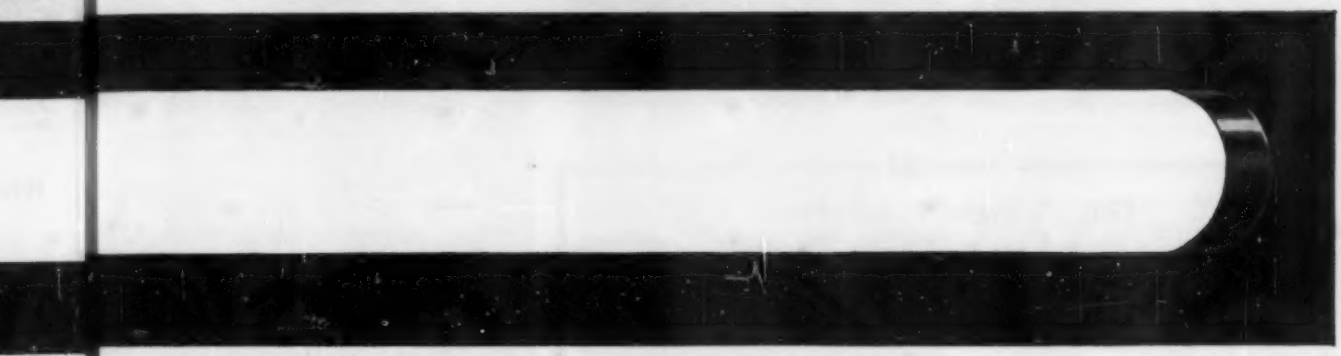
An important part of Revere's service is the custom design and production of any special equipment needed for the job.

N E

Westinghouse HIGH the brightest 40-watt lamps you

- 3200 lumens output for 40-watt lamps
- 6400 lumens output for 96" Slimline lamps
- No premium cost
- No extra cost for power
- Just snap into your present fixtures

W !



EFFICIENCY Lamps... and slimline fluorescent can buy

Now you can increase the lighting level in your factory, office, warehouse or store without changing a single fixture, without adding to power costs and without paying a premium price for the lamps.

These new High Efficiency Westinghouse Fluorescent Lamps (40-watt Universal and 96" Slimline types) give 15% more light than the cool white and 36% more light than the daylight lamps you now use. They maintain highest levels of light over their long life.

Try High Efficiency Lamps in an entire work area. If you don't agree that you get more light—softer, more comfortable light—we will exchange them for any Westinghouse fluorescent lamps of your choice.

Order new "H.E." lamps today from your authorized Westinghouse Lamp Agent or nearest Westinghouse Lamp Sales Office. You can be sure . . . if it's Westinghouse.

Westinghouse

WESTINGHOUSE LAMP DIVISION
Westinghouse Electric Corporation, Bloomfield, N. J.

(Continued from page 14A)

Wide-Lite. The lighting company, which plans to retain present policies, operating procedures and personnel, now has production facilities in Houston and Vermilion, Ohio, with a third plant under construction in San Marcos, Texas.

The establishment of an organization to handle new and special products has been announced by the Westinghouse Lamp Division, Bloomfield, N. J. The new special products group will be directed by **Gordon W. Howson,** large lamp marketing manager, and headed by **George B. Saviers,** who will report directly to Mr. Howson.

Sylvania Electric Products Inc. has announced the opening of a new distribution center in Minneapolis to cover warehousing, sales, and service to the company's distributors in Minnesota, North and South Dakota, northern Iowa and parts of Wisconsin. **Thomas J. Coghlin,** formerly of Sylvania's sales office in Kansas City, will direct administrative operations at the new center. **John J. Bahnak** (A) will be responsible for sales of lighting products, and **Kenneth D. Larsen** and **Jerry C. Krall** will handle photolamp and electron tube sales, respectively.

The appointment of **Larry J. LeVieux** as advertising and sales promotion specialist for General Electric's Ballast Department, Danville, Ill., has been announced by C. Gus Grant, manager of marketing for the department. In his new position, Mr. LeVieux will be responsible for the coordination of the department's advertising and sales promotion activities.

1961 IES Regional Conferences

Region	Date and Place	Chairman
East Central	April 10-11 Benjamin Franklin Hotel Philadelphia, Pa.	Ralph R. Enghouser Sylvania Electric Products 4700 Parkside Ave. Philadelphia, Pa.
Southwestern	April 17-18 Skirvin Hotel Oklahoma City, Okla.	Paul R. Sheline Paul R. Sheline Co. 1715 Linwood Blvd. Oklahoma City, Okla.
Southeastern/ South Central	April 20-21 Biltmore Hotel Atlanta, Ga.	Charles R. Minors Georgia Power Co. P. O. Box 1719 Atlanta, Ga.
Inter-Mountain	May 1-2 Salt Lake City, Utah	Wayne F. Mulcock Utah Power & Light Co. P. O. Box 899 Salt Lake City, Utah
South Pacific Coast	May 4-5 Sacramento Inn Sacramento, Calif.	M. P. Fenton Smoot-Holman Co. 1331 T St. Sacramento, Calif.
Pacific Northwest	May 8-9 Harrison Hot Springs Harrison, B. C.	E. A. Adams Griffon Sales Ltd. 551 W. 8th Ave. Vancouver, B. C.
Canadian	May 15-16 Queen Elizabeth Hotel Montreal, Que.	J. P. Cristel Shawinigan Water & Power 600 Dorchester St. West Montreal, Que.
Northeastern	June 8-9 Berkeley-Carteret Hotel Asbury Park, N. J.	Bruce J. Jensen Public Service Electric & Gas Co. 80 Park Place Newark, N. J.
Great Lakes	June 19-20 Sheraton-Gibson Hotel Cincinnati, Ohio	H. K. Flint 2926 Debreck Ave. Cincinnati, Ohio

Gunther J. Landers has joined the Crouse-Hinds Co., Syracuse, N. Y., as product development manager, according to an announcement by R. J. Sloan, president of the concern. Mr. Landers was previously associated with the Blaw Knox Co., New York Air Brake Co. and Westinghouse Electric Corp.

The appointment of **James H. Moses** as director of marketing for the Chicago Miniature Lamp Works, Chicago, has been announced by Ernest E. Freeman, president of the firm. Mr. Moses will assume direction of the company's marketing and sales operations.

Paul La Vigne has been appointed general manager of Lighting Dynamics, a division of the John C. Virden Co., Los Angeles, according to an announcement by John C. Virden, Jr., president of the concern. Mr. La Vigne, from headquarters in El Monte, Calif., will be responsible for the national marketing, sales and manufacturing programs of Lighting Dynamics, as well as for the direction of sales of Virden residential lighting equipment in the West.

The National Office Management Association has named **Mayo A. Harvey** as representative to the recently-organized Sectional Committee of the American Standards Association. The new committee, which is known as X4, is responsible for the development of American office machine standards.

The Major Equipment Co., Inc., Chicago, has announced the appointment of **Grover R. Kehoe** as plant manager. Formerly assistant to the president, Mr. Kehoe's new duties include the supervision of the Lighting Division as well as the new Alzak reflector plant.

Robert E. Bergmann has been named assistant plant manager of the Des Plaines, Ill. manufacturing installation of the Benjamin Division of Thomas Industries Inc., Louisville, Ky. Mr. Bergmann will report directly to **George Hamm,** over-all plant manager.

William Featherstone has been named products sales manager of the West Coast Division of Hubbard and Co., Chicago. Mr. Featherstone, who will report to **Raymond M. Waggoner,** vice-president—West Coast, assumes responsibility for the firm's sales and marketing, training and engineering programs in 11 states. Also announced by Hubbard were the appointments of **Douglass S. List** as division manager of the Midwest Division and of **James H. Rusk** as district manager of the

(Continued on page 21A)

Glass for lighting

A QUICK LOOK AT LIGHTING PROBLEMS ✓ SOLUTIONS ✓ USES ✓

GLASS TO FIGHT THE ELEMENTS

Glass for signaling is generally an outdoor proposition. Which means that it has to take all kinds of weather in all kinds of climates. This bobbing buoy bouncing outside a salt-water harbor is a good example. It's got to be there . . . got to be working. Reasons why it isn't won't do.

The assurance that pilots and sea captains will see this buoy comes from the fact that there's a PYREX brand globe over the light bulb. The globe protects it and the light stays on in hot weather and cold, in snow, sleet, rain, ice, salt spray and hurricanes.

A CASE OF COSTS

A manufacturer we know makes top-notch shot-blasting equipment for cleaning metal castings. Light bulbs are needed to see what's going on. The shot made too many bulbs go *poof*. There were two possible solutions, neither very practical. It boiled down to this: either work in the dark, or spend a small fortune to replace broken bulbs.

We came up with a different answer, a special heavy-wall glass globe, a half-inch thick, that covers the bulb to protect it. Now, there's plenty of light, and no shattered bulbs. Perhaps there's a place in your operation for glass that works . . . glass that saves you money.

A MATTER OF DESIGN

This round lens throws a *rectangular* beam, but it's intentional. An oil company needed several lights that would play rectangular beams on rectangular signs. The signs were 4- by 8-foot outdoor advertising displays, and they had to be lighted without hot spots that would make them tough to read.

Crouse-Hinds of Syracuse, N. Y., the firm handling the lighting, came to us with the problem. This lens does the job, yet it fits the standard shape lighting fixture. True, Crouse-Hinds could have built a special lighting fixture, but the cost would have naturally been higher. This light does what's needed and keeps costs at a sensible level.

While it's unusual, it's typical of the special lighting problems we tackle regularly.

A PROBLEM OF COMFORT

TV performers don't always have to go to the beach for their sun. They frequently get sunburned while on camera, but they don't recommend it as the best way to pick up a healthy tan. The intense heat generated by the big studio lights is mighty uncomfortable. Add to this the problem of telecasting from a room that just *can't* be air-conditioned during a hot summer night in Nashville, Tennessee. That's what faced the cast of "Grand Ole Opry" a few years back.

The suggestion was made that PYREX brand infrared reflecting glass could do wonders in reducing the heat. Sheets of this glass were bracketed to the front of the studio lights. They cut the heat output by 50%, yet retained 75% of the light output. The show did go on . . . comfortable, too. If you need a glass to keep light and cut heat, contact us. We'll be glad to help.

Lighting can pose problems, but glass faces up to them like no other material. If your problems are like these . . . or vastly different . . . let us know about them. Send the coupon below if you'd like more information on the role of glass in lighting.

CORNING MEANS RESEARCH IN GLASS

CORNING GLASS WORKS, 61-12 Crystal Street, Corning, N. Y.

Please send me the following:

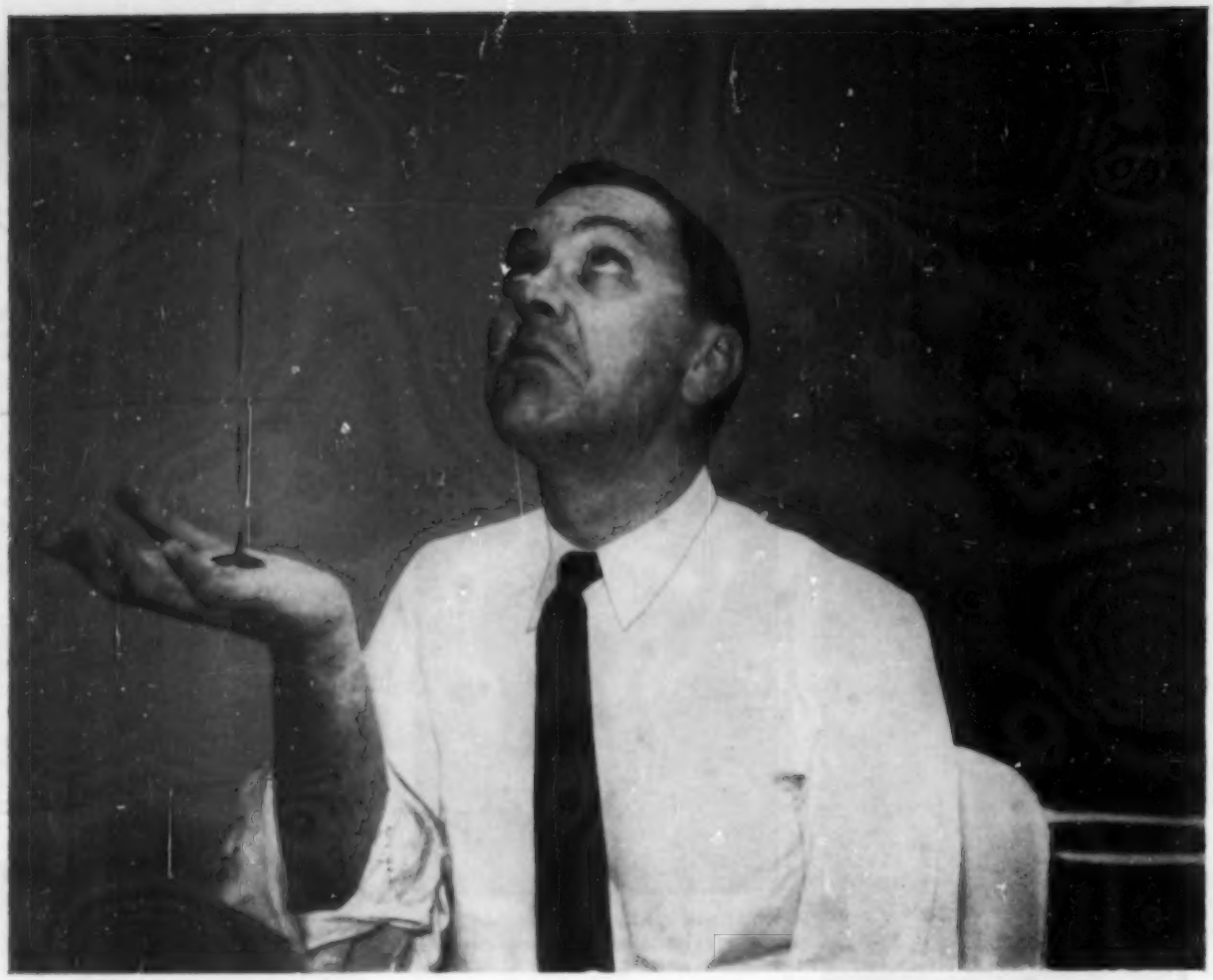
- ☐ Properties of Selected Commercial Glasses
- ☐ Designing with Glass for Industrial, Commercial and Consumer Applications
- ☐ Commercial Lighting Applications Guide

Name..... Title.....

Company.....

Address.....

City..... Zone..... State.....



Jefferson's new DRI-LOK ballast can't drip compound—ever!

Jefferson has definitely solved the messy problem of ballast compound leakage—by replacing conventional compound with an entirely new thermo-setting material. It fills the *entire* case and *permanently* bonds case, core and coil into one solid unit. This dry, solid-fill material is so chemically and physically stable, it cannot combine or react with any other material in the ballast—it cannot soften or liquefy under any operating conditions—for the life of the ballast. The DRI-LOK is the only ballast ever built that offers this positive protection against compound leakage.

THE NEW DRI-LOK BALLAST IS ENGINEERED TO MEET NEWLY PROPOSED CBM HIGHER LIGHT OUTPUT STANDARDS

The extreme stability and solidity of the DRI-LOK fill material assures that *every* DRI-LOK ballast will deliver uniform full rated light output, and be uniform in temperature and sound level, whether the installation contains 2 or 200 ballasts!

Write today for complete details and specifications.

Jefferson DRI-LOK
New Blue FLUORESCENT BALLASTS

Jefferson Electric Company • Bellwood, Illinois

WARM WELCOME for chilled shoppers at Saks Fifth Avenue, one of New York's leading department stores, is prepared by a heating-lighting system installed under marquees above the store entrances. Twenty-four 1000-watt tubular quartz infrared lamps in two-lamp louvered reflectors with 45-degree shielding are mounted under the marquee roof, 15 feet above the sidewalk. Lighting levels of 750 footcandles at a point five feet above the sidewalk are probably the highest on a sidewalk—anywhere. Radiant heat of about 90 watts per square foot five feet above the sidewalk is equivalent to the heat from the sun on a warm summer day. Unlike the blankets of warm air produced by conventional heating systems in enclosed areas, the heat from the infrared rays cannot be blown away. In addition to providing heat and light, the system will create a safer, more attractive entranceway by evaporating water puddles and melting accumulations of ice and snow. Photo and data courtesy General Electric Co., Cleveland, Ohio.

(*Continued from page* 18A)

major portion of Wisconsin and eastern Iowa. Mr. List will have supervision over all sales personnel assigned to the Midwest Division territory, which extends from North Dakota through Missouri and from northern Indiana to Ohio.

Two new appointments in the western sales operation of Day-Brite Lighting, Inc., St. Louis, Mo., have been announced by Carl L. Powell, Western Division general manager. **James C. Ramsey,** formerly San Jose, Calif., sales representative, was named regional sales manager, effective immediately. Mr. Ramsey will have his offices in Santa Clara, Calif. The San Jose territory will be covered by **Leon P. O'Neill,** who has joined Brundage Lighting Associates, Day-Brite's San Francisco representatives.

Al Griffin has joined the Western Lighting Corp., Los Angeles, as sales representative. Mr. Griffin was formerly associated with the lighting fixture department of Gough Industries.

The **S. D. White Co.,** Seattle, Wash., and **Jensen Electrical Manufacturing Co.,** Toronto, Canada, have been appointed sales representatives for the Lamplighter Series 15,000 photoelectric control for street and other outdoor lighting applications. The Lamplighter was developed by The Acme Wire Co., Utility Products Division, New Haven, Conn.

Harry Kramer and **Sam Shaw** have been named sales representatives for the Crownlite Fluorescent Co., Mineola, N. Y. Mr. Kramer, from headquarters in Brookline, Mass., will cover the New England states. Mr. Shaw will represent the company in New York City.

Deaths

J. V. Butler, Florida Section.
S. J. Cornblatt, Maryland Section.
W. M. Graham, Oregon Section.
R. H. Grim, Eastern Pennsylvania Section.
W. V. Fisk, San Jacinto Section.
P. J. Knox, New England Section.
L. A. Penney, New York Section.
C. B. Peterson, Chicago Section.
M. T. Reeves, Georgia Section.
W. G. Roberts, Pittsburgh Section.
W. A. Shafer, Indiana Section.
E. T. Tinstman, Pittsburgh Section.

BOOKS AND PAMPHLETS

*Books marked * may be inspected in the Technical Office at Headquarters.*

National Electrical Code Handbook, based on the 1959 Edition of The National Electrical Code, revised by Frank Stetka, published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Price: $8.50.

Prepared under the supervision of the National Fire Protection Association, this tenth edition of the handbook presents methods of electrical wiring and installation in strict accordance with the latest National Electrical Cide. The book interprets rules and measurements for electrical jobs and provides examples of the calculation of electrical load, number of branch circuits and size of feeders. Reorganization in line with the rearrangement and renumbering of the National Electrical Code and changes in basic requirements are included in this edition.

Arranging the Classroom for TV Viewing by Willard Allphin, available from Commercial Engineering Department, Sylvania Lighting Products, 60 Boston St., Salem, Mass. No charge.

The arrangement of a classroom for TV viewing, with special emphasis on good visibility of the picture, a comfortable visual environment and maintenance of pupil attention, is described in this bulletin. Recommendations are made for the establishment of television set height and viewing distances, use of window shades, use of electric light for both direct and indirect lighting and methods of minimizing reflections.

Photoperiodism and Related Phenomena in Plants and Animals,* edited by Robert B. Withrow, published by American Association for the Advancement of Science, Washington, D. C., Publication No. 55, 1959, 878 pages, indexed. $14.75 ($12.50 to AAAS members).

This book is a record of the proceedings of the Conference on Photoperiodism, October 29 to November 2, 1957, sponsored by the Committee on Photobiology of the National Academy of Sciences, National Research Council and supported by the National Science Foundation.

The proceedings are grouped into the following sections: Photochemical Principles, Photocontrol of Seed Germination and Vegetative Growth by Red Light, Role of Chemical Agents in Photocontrol of Vegetative Growth, Photoperiodic Con-

(*Continued on page* 22A)

JUG-HANDLE intersection on U. S. 1 in Port Mercer, N. J., is lighted to level of .5 footcandle as an aid to driver safety. This installation of two- and four-lamp six-foot fluorescent luminaires mounted on aluminum standards 25 feet above the roadway is one of 30 such traffic aids along a 36-mile strip of truck-clogged highway. In the jug-handle intersection, designed as one of the steps between overpasses and uncontrolled intersections, the highway is the "jug," and a driver wishing to make a left turn simply turns right at the base of the handle, travels to the top, then turns left along the top of the handle, crossing the jug at a signal-controlled intersection. Photo and data courtesy General Electric Co., Hendersonville, N. C.

(Continued from page 21A)

trol of Reproduction in Plants, Growth Factors and Flowering, Analysis of Plant Photoperiodism, The Relation of Light to Rhythmic Phenomena in Plants and Animals, Photoperiodism in the Invertebrates, Photoperiodism in the Vertebrates, Photoperiodic Control of Reproduction and Migration in Birds, and Control of Periodic Functions in Mammals by Light.

Lighting For Industry, available from the Better Light Better Sight Bureau, 750 Third Ave., New York 17, N. Y.

Designed for the plant executive, this booklet is intended to supplement the efforts being made to gain acceptance for the new higher lighting levels recommended for industry. Prepared by the Bureau's Lighting Information Committee, the booklet includes the recommended levels, an explanation of the IES-sponsored Blackwell research program upon which these levels are based, a discussion of the quality factors in industrial lighting, an explanation of the specific benefits which can result from a properly lighted plant and case histories of specific installations.

The booklet is available at 25 cents each in quantities under 100, $20 per hundred in quantities up to 1000 and $180 per thousand in quantities of 1000 or more.

American Standards for Physical and Electrical Characteristics of 250-Watt (H5) BT-28 Mercury Lamp, C78.1301-1960; **175-Watt (H22) BT-28 Mercury Lamp,** C78.1308-1960; **250-Watt (H5) BT-28 Mercury-Fluorescent Lamp,** C78.1315-1960; **175-Watt (H22) BT-28 Mercury-Fluorescent Lamp,** C78.1316-1960, available from Dept. PR 171, American Standards Association, 10 East 40th St., New York 16, N. Y. 35 cents each.

These standards recently approved and published by ASA cover lamp designations, physical and operating characteristics and starting requirements for the lamps specified.

Infrared Radiation,* by Henry I. Hackforth, published by McGraw-Hill Book Co., Inc., New York 36, N. Y., 1960, 288 pages, illustrated and indexed. $10.00.

The author, who is a member of the Research Staff, Nortronics, Division of Northrop Corp., has written this book for use in junior college and university courses and for those desiring background information in the field of infrared radiation (IR), its basic principles and its applications.

Part I of this two-part book deals with the basic principles of IR and contains chapters on basic physical laws, sources, atmospheric transmission of IR, IR optical components and materials, and infrared detectors. Part II covers applications and has chapters on infrared instruments and applications in the sciences, industry and space technology. Chapters are followed by references and additional bibliographic material. An appendix listing books on IR and related subjects is also included.

NEW MEMBERS

At the meeting of the IES Council in New York City on November 17, 1960, the following were elected to membership. Names marked * are transfers from Associate Member Grade. Names marked ** are transfers from Student Member Grade.

CANADIAN REGION

Bluenose Chapter

No elections.

Forest City (London) Chapter

No elections.

Golden West Chapter

Associate Member:

McGuffin, J. W., Angus Butler & Associates, Regina, Sask.

Hamilton, Ontario Chapter

No elections.

Maritime Chapter

No elections.

Montreal Section

Associate Members:

Brown, E. G., 7380 24th Ave., St. Michel, Que.

Ott, Antoine, Electrolier Mfg. Co., Montreal, Que.

Northumberland Chapter

No elections.

Ottawa Chapter

Associate Member:

Mitchell, G. W., Canadian Westinghouse Co. Ltd., Ottawa, Ont.

Quebec Chapter

Member:

Ducasse, Paul, Electrolier Mfg. Co. Ltd., Quebec, Que.

Associate Member:

Lagace, J. M., Leblanc Montpetit & Lagace, Quebec, Que.

St. Maurice Valley Chapter

No elections.

Toronto Section

Member:

*Shiff, H. I., Shell Oil Co. of Canada, Ltd., Toronto, Ont.

Associate Member:

McVicar, I. J., Nicholas Fodor & Associates Ltd., Toronto, Ont.

Winnipeg Chapter

Associate Member:

Savard, J. F., Canadian Westinghouse Co. Ltd., Winnipeg, Man.

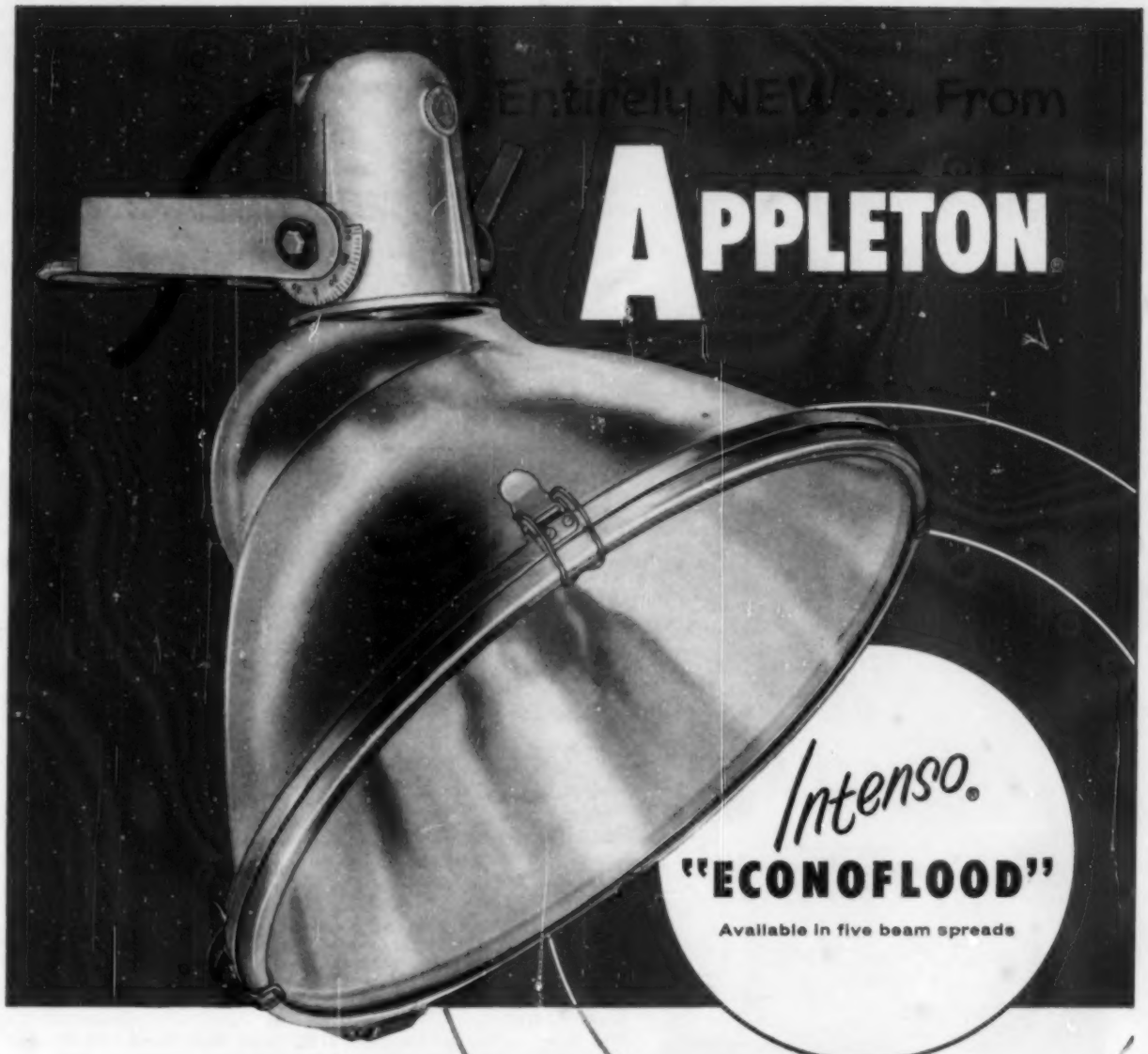
EAST CENTRAL REGION

Capital Section

Member:

Dauray, A. C., U. S. Army Engineer Research & Development Laboratories, Ft. Belvoir, Va.

(Continued on page 23A)



Feature for feature, Dollar for Dollar, "Econoflood" Floodlight is a Tremendous Buy!

- **Built-on locking wrench permits reversing fixture for easy relamping. Fixture snaps back into preset position when turned forward.**
- **Stepped up lighting volume . . . increased lumens!**
- **Absolute minimum condensation through air-moisture vent and filter wick!**
- **Completely weatherproofed!**
- **Finest corrosion-resisting materials, for longer life, greater efficiency!**
- **Easy, easy maintenance!**

"Econoflood" is intensely brilliant because an exclusive, self-centering inner reflector augments the primary Alzak* reflector. Has positive, locked-in precision aiming, 180° horizontal and vertical scales. It's a new high in floodlight efficiency . . . a product of Appleton's new Lighting Laboratory.

Easy, flexible installation; versatile, interchangeable accessories. Parts of quality stainless steel and pressure cast aluminum. Five efficient beam spreads cover all requirements, including plant security, sports areas, billboards and parking-shopping centers.

Sold through franchised distributors only

WRITE TODAY FOR BULLETIN EFL-960

APPLETON electric company

Also Manufacturers of:

* A proprietary term of the Aluminum Company of America

1701 Wellington Avenue, Chicago 13, Illinois

P & K OUTDOOR LIGHTING REPORT

the Modern Trend in LOW LEVEL LIGHTING

TOP PHOTO: Location: Rath Park, Franklin Square, L. I., N. Y.
Architect: Herbert D. Phillips
Consulting Engineers: Barstow, Mulligan & Vollmer
LOWER PHOTO: Location: Fairleigh Dickinson University, Madison, N. J.
Electrical Consultant: H. L. Sykes

modern lighting at a realistic cost

Here are two contemporary outdoor lighting installations – one an all new municipal swimming pool and recreational area – the other, a prominent New Jersey University. Both chose the P&K all aluminum CIRCLElux lighting package to illuminate and compliment their roadways, walkways, landscape and architecture.

The sweeping lines of the P&K CIRCLElux davit blend with the modern one story architecture of the Rath Park Swimming Pool. Yet, the modern, but stately, design of the P&K CIRCLElux post is in good taste with the traditional architecture of Fairleigh Dickinson University. The CIRCLElux lighting package is the correct low level lighting choice to compliment almost all types of architecture.

The P&K CIRCLElux is available in a wide range of davit styles and mounting heights. The post is available in one basic design but at various mounting heights and with the CIRCLElux you have a choice of three light sources – incandescent, mercury vapor and fluorescent. This combination of luminaires and davits or posts will enable you to specify "packaged" lighting units. This means easier specifying by using matched components which in turn can customize your lighting projects.

Send in your reservation now for the *new* CIRCLElux catalog.

P&K

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BRANCH SALES OFFICES: MIAMI, FLORIDA; BURLINGAME, CALIFORNIA
IN CANADA: POWERLITE DEVICES, LTD., TORONTO, MONTREAL, VANCOUVER
EXPORT REPRESENTATIVE: PHILIPS EXPORT CO., NEW YORK, N. Y.

(*Continued from page 22A*)

Associate Member:

Engle, C. B. 3rd, Potomac Electric Power Co., Washington, D. C.

EASTERN PENNSYLVANIA SECTION

Members:

Diffenderfer, S. F., Pennsylvania Power & Light Co., Allentown, Pa.
Glick, F. E., Pennsylvania Power & Light Co., Allentown, Pa.
Robison, W. R., Dauphin Electric Supplies Co., Harrisburg, Pa.

MARYLAND SECTION

Associate Member:

James, H. C., Green Associates, Baltimore, Md.

PHILADELPHIA SECTION

Members:

Hahn, D. F., General Electric Co., King of Prussia, Pa.
*Purdum, S. W., Philadelphia Electric Co., Philadelphia, Pa.

Associate Member:

Hessinger, R. H., Flynn's Camden Electric Co., Merchantville, N. J.

PITTSBURGH SECTION

Member:

*Morgan, R. G., Sylvania Electric Products Inc., St. Marys, Pa.

Associate Members:

Falchetti, R. L., West Penn Power Co., Greensburg, Pa.
Mortimore, D. W., West Penn Power Co., Greensburg, Pa.
Posney, T. A., Posney Eletcric Supply Co., Tarentum, Pa.

VIRGINIA SECTION

Member:

Allen, A. E., A. E. Allen Co., Richmond, Va.

Associate Member:

Upchurch, R. A., A. E. Allen Co., Richmond, Va.

GREAT LAKES REGION

BUCKEYE CHAPTER

No elections.

CENTRAL NEW YORK SECTION

Associate Member:

Mounteer, J. E., Corning Glass Works, Corning, N. Y.

CLEVELAND SECTION

Associate Members:

Burns, R. T., Westinghouse Electric Corp., Cleveland, Ohio.
Erb, E. E., Westinghouse Electric Corp., Cleveland, Ohio.
Merritt, C. S., Westinghouse Electric Corp., Cleveland, Ohio.
Mosher, L. O., Westinghouse Electric Corp., Cleveland, Ohio.
Nabors, D. B., Westinghouse Electric Corp., Cleveland, Ohio.
Pike, Rowland, Westinghouse Electric Corp., Cleveland, Ohio.
**Peterson, R. A., Westinghouse Electric Corp., Cleveland, Ohio.

KENTUCKIANA CHAPTER

No elections.

MIAMI VALLEY CHAPTER

Associate Members:

Elardo, F. P. Jr., Lite-Rite Inc., Dayton, Ohio.
Haywood, C. R., 5051 Springfield St., Dayton, Ohio.
Klein, D. K., Hughes Simonson Inc., Dayton, Ohio.
Smith, George E., Graybar Electric Co., Dayton, Ohio.

MICHIGAN SECTION

Members:

*Kieb, N. A., Albert Kahn Associates, Detroit, Mich.
*Rose, J. E., Detroit Edison Co., Birmingham, Mich.

ASTRONOMICAL time clock device which makes daily compensations for sunrise and sunset times controls all outdoor lighting at the C & P Plaza, a medium-sized shopping center located east of Madison, Wis. The time control automatically advances or retards the "on" and "off" trippers in accordance with daylight hours and changes with the seasons to remain in true orientation with the sun. Photo and data courtesy of Paragon Electric Co., Two Rivers, Wis.

Associate Member:

Flaherty, C. J., 29046 Tessmer Court, Madison Heights, Mich.

NORTHWESTERN OHIO SECTION

No elections.

OHIO VALLEY SECTION

Member:

*Glaser, E. T., The F. D. Lawrence Electric Co., Cincinnati, Ohio.

ROCHESTER SECTION

Member:

Fraim, R. A., Jr., 155 Rye Road, Rochester, N. Y.

WESTERN MICHIGAN SECTION

Associate Members:

Laskowski, R. G., Sylvania Electric Products Inc., Grand Rapids, Mich.
Ryan, C. J., Westinghouse Elesctric Corp., Muskegon, Mich.
Wierama, J. L., Consumers Power Co., Muskegon, Mich.

WESTERN NEW YORK SECTION

Associate Members:

Fairbanks, R. G., Appleton Electric Co., Buffalo, N. Y.
Measer, R. E., New York State Electric & Gas Corp., Lancaster, N. Y.
Travers, W. D., New York State Electric & Gas Corp., Lockport, N. Y.

INTERMOUNTAIN REGION

ARIZONA SECTION

Associate Member:

Winston, K. W., Arizona Public Service Co., Phoenix, Ariz.

NEW MEXICO CHAPTER

Associate Members:

Brown, Kenneth, Graybar Electric Co., Inc., El Paso, Texas.
Connington, P. J., Appleton Electric Co., El Paso, Texas.
Taylor, R. W., Westinghouse Electric Corp., El Paso, Texas.

ROCKY MOUNTAIN SECTION

Member:

Hanley, G. H., General Electric Co., Denver, Colo.

Student Member:

Scheuer, Arthur, University of Denver, Denver, Colo.

SOUTHERN COLORADO CHAPTER

No elections.

UTAH SECTION

Associate Member:

Goodsell, L. C., Goodsell Electric, Inc., Ogden, Utah.

MIDWEST REGION

CENTRAL KANSAS CHAPTER

No elections.

CORNHUSKER SECTION

Associate Members:

Berner, W. L., Westinghouse Electric Corp., Omaha, Nebr.
Cramer, W. A., Westinghouse Electric Corp., Omaha, Nebr.
Whitmer, A. J., ABC Electric, Lincoln, Nebr.
Williams, Gene, Graybar Electric Co., Omaha, Nebr.

HEART OF AMERICA SECTION

No elections.

ILLINI CHAPTER

No elections.

IOWA SECTION

Associate Member:

Turner, Merle, Iowa Southern Utilities Co., Creston, Ia.

OZARK CHAPTER

No elections.

ST. LOUIS SECTION

Associate Members:

Grandy, C. N., Union Electric Co., St. Louis, Mo.
Gray, H. L., 8748 Sturdy Drive, St. Louis, Mo.
Short, Helen J., J. & A. Springman, Inc., Godfrey, Ill.

NORTH CENTRAL REGION

CENTRAL ILLINOIS CHAPTER

No elections.

CHICAGO SECTION

Associate Members:

Bell, E. J., Hub Electric Co. Inc., Chicago, Ill.
George, D. A., Steber Manufacturing Co., Broadview, Ill.
Lenart, J. S., Benjamin Division, Thomas Industries Inc., Des Plaines, Ill.

INDIANA SECTION

Associate Member:

Bower, L. T., Bower & Son, Shelbyville, Ind.

(*Continued on page 26A*)

(Continued from page 25A)

MILWAUKEE SECTION

Associate Member:

Erickson, A. L., 3333 S. 77th St., Milwaukee, Wis.

TWIN CITY SECTION

Associate Members:

Anderson, J. W., Insulation Sales Co., Minneapolis, Minn.
Freedland, L. D., Lewis D. Freedland, Consulting Engineer, Minneapolis, Minn.
McLaughlin, Karl, W. D. Anderson Sales Co., Minneapolis, Minn.
Miller, W. D., United States Fish & Wildlife Service, Minneapolis, Minn.
Zimmer, J. K., Northern States Power Co., St. Paul, Minn.

TWIN PORTS CHAPTER

No elections.

NORTHEASTERN REGION

CONNECTICUT SECTION

No elections.

EASTERN NEW YORK

Member:

St. Clair, R. C., Barker & Henry, Architects & Engineers, Glens Falls, N. Y.

Associate Member:

Estey, C. G., Hartheimer, Architect, Albany, N. Y.

HOUSATONIC CHAPTER

Associate Member:

Le Cause, J. F., George J. Steinhardt, Inc., Bridgeport, Conn.

NEW ENGLAND SECTION

No elections.

NEW JERSEY SECTION

Members:

*Huck, Kenneth, Reliable Electrical Supply Co., Newark, N. J.

Associate Members:

De Caro, A. B., Radiant Lamp Corp., Newark, N. J.
Martus, J. J., Radiant Lamp Corp., Newark, N. J.
Turk, A. L., N. J. Electric Supply Co., Newark, N. J.

NEW YORK SECTION

Associate Members:

Jacobs, E. J., Litecraft Mfg. Corp., New York, N. Y.
Sheldon, Sidney, Litecraft Mfg. Corp., New York, N. Y.
Slater, H. A., Slater Electric & Mfg. Co. Inc., Glen Cove, N. Y.
Toomey, H. M., W. R. C. Smith Publishing Co., New York, N. Y.

YANKEE SECTION

No elections

PACIFIC NORTHWEST REGION

BRITISH COLUMBIA SECTION

Associate Member:

Bailey, Frederick, Federal Pacific Electric of Canada, Vancouver, B. C.

CHINOOK CHAPTER

Member:

Davies, C. F., Industrial Electrical Contractors, Ltd., Calgary, Alta.

EDMONTON SECTION

Associate Member:

Ferguson, W. M., Department of Transport, Edmonton, Alta.

INLAND EMPIRE CHAPTER

No elections

OREGON SECTION

Associate Member:

Keys, P. H., Pacific Power & Light Co., Portland, Ore.

PUGET SOUND SECTION

Associate Members:

Elijah, A. E. Sr., John Graham & Co., Seattle, Wash.
Fiske, R. W., Pacific Lighting Fixture Works, Seattle, Wash.

VANCOUVER ISLAND CHAPTER

No elections

SOUTH CENTRAL REGION

ALABAMA SECTION

Associate Member:

Anderson, A. R., Moore-Handley, Birmingham, Ala.

ARKANSAS CHAPTER

Associate Member:

Venable, Jack, Jim Venable & Associates, Little Rock, Ark.

GULF COAST CHAPTER

Member:

Deupree, E. M., 55½ N. Royal St., Mobile, Ala.

MID-SOUTH CHAPTER

Member:

Reiter, Murray, L & P Lighting, Inc., Olive Branch, Miss.

Associate Members:

Hays, G. A., Southern College of Optometry, Memphis, Tenn.
Wingerd, K. G., General Electric Co., Memphis, Tenn.

Student Members:

Authier, R. L., Southern College of Optometry, Memphis, Tenn.
Beaujon, Herbert, Southern College of Optometry, Memphis, Tenn.
Bess, R. D., Southern College of Optometry, Memphis, Tenn.
Bowman, M. G., Southern College of Optometry, Memphis, Tenn.
Camp, N. M., Southern College of Optometry, Memphis, Tenn.
Church, L. H., Southern College of Optometry, Memphis, Tenn.
Hester, C. R., Southern College of Optometry, Memphis, Tenn.
Hodges, G. C., Southern College of Optometry, Memphis, Tenn.
Kuhlmann, J. L., Southern College of Optometry, Memphis, Tenn.
Nelson, P. E. Jr., Southern College of Optometry, Memphis, Tenn.
Osborn, T. E., Southern College of Optometry, Memphis, Tenn.
Ryals, O. G., Southern College of Optometry, Memphis, Tenn.
Tucker, H. W. Jr., Southern College of Optometry, Memphis, Tenn.
Williams, B. L., Southern College of Optometry, Memphis, Tenn.

MISSISSIPPI CHAPTER

No elections

NEW ORLEANS SECTION

Member:

*Morris, W. D., Louisiana State University, Baton Rouge, La.

Associate Member:

Jones, Mrs. E. P., E. P. Jones, Jr., New Orleans, La.
Metoyere, Ruby, Interstate Electrical Supply, New Orleans, La.

TENNESSEE VALLEY SECTION

No elections

SOUTHEASTERN REGION

CENTRAL FLORIDA CHAPTER

No elections

COASTAL EMPIRE CHAPTER

No elections

FLORIDA SECTION

No elections

GEORGIA SECTION

Member:

Koen, Jim, Georgia Power Co., Rome, Ga.

Associate Members:

Bell, F. P., W. R. C. Smith Publishing Co., Atlanta, Ga.
Gokce, Osman, Research & Industrial Co., Atlanta, Ga.

PALMETTO CHAPTER

No elections

SOUTHEAST FLORIDA SECTION

No elections

SUWANNEE RIVER CHAPTER

No elections

TAR HEEL SECTION

Associate Members:

Clark, J. D., Duke Power Co., Greensboro, N. C.
Edge, N. L., Carolina Power & Light Co., Southern Pines, N. C.
Hunt, R. L., Electric Supply Inc., High Point, N. C.
Wooten, W. T., Carolina Power & Light Co., Southern Pines, N. C.

SOUTH PACIFIC COAST REGION

ARROWHEAD CHAPTER

Associate Member:

Turner, E. D., California Electric Power Co., San Bernardino, Calif.

DIABLO SECTION

Member:

*Bertolone, F. J., Curtis-AllBrite Lighting Inc., South San Francisco, Calif.

Associate Members:

Fender, C. W. Jr., Wellmade Metal Products Co., Oakland, Calif.
Wong, C. A., Mare Island Naval Shipyard, Vallejo, Calif.

GOLDEN GATE SECTION

Members:

*Humber, M. R., Humber & Walker Co., San Francisco, Calif.

(Continued on page 40A)

IES National Technical Conferences

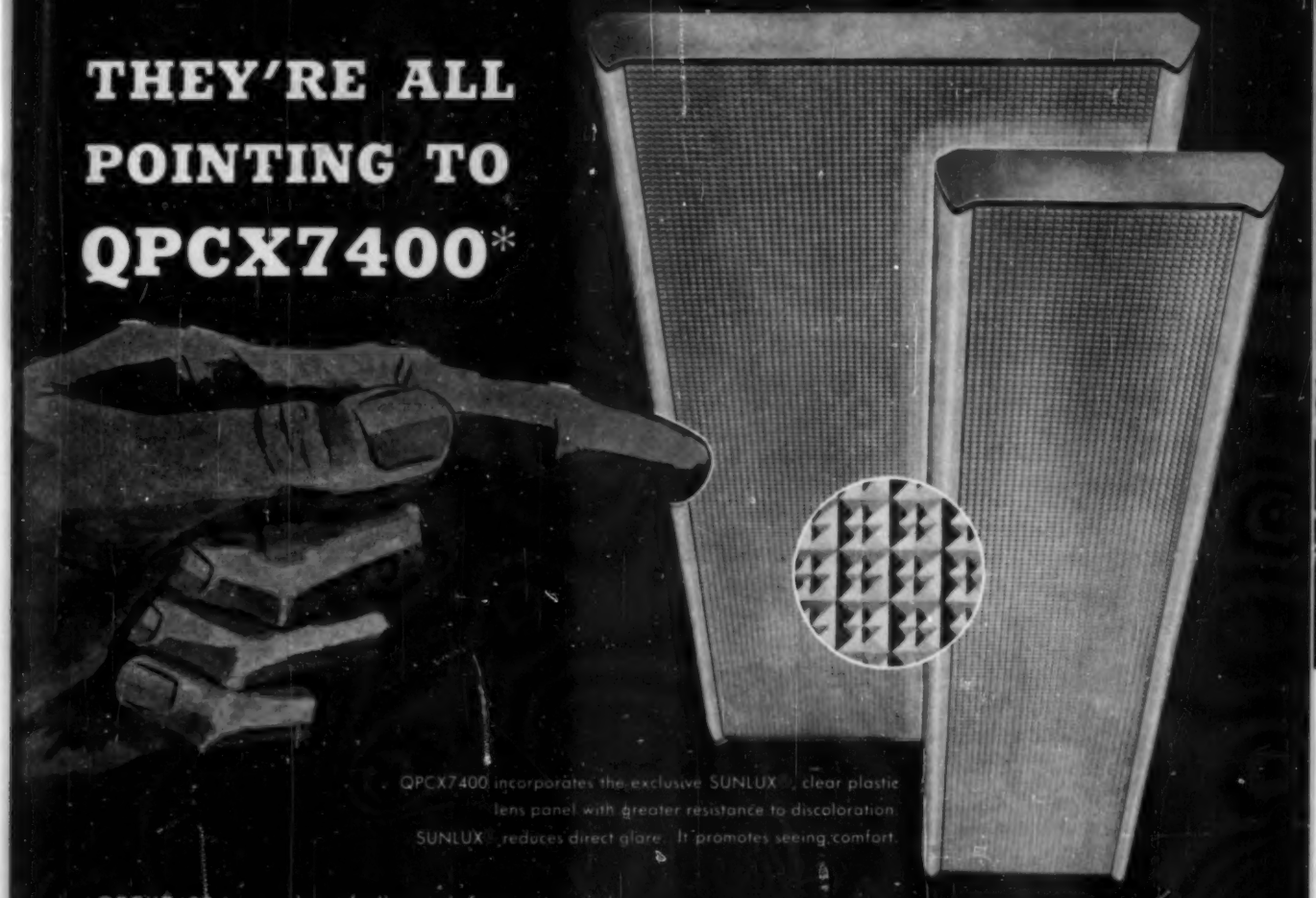
1961—September 24-29—Chase Park Plaza Hotel, St. Louis, Missouri

1962—September 9-14—Statler-Hilton Hotel, Dallas, Texas

1963—September 8-13—Sheraton-Cadillac Hotel, Detroit, Michigan

1964—August 30-September 3—Fontainbleau Hotel, Miami Beach, Florida

THEY'RE ALL POINTING TO QPCX7400*



QPCX7400 incorporates the exclusive SUNLUX™ clear plastic lens panel with greater resistance to discoloration. SUNLUX™ reduces direct glare. It promotes seeing comfort.

*QPCX7400 is an ultra-shallow, surface-mounted Visionaire™ lighting fixture to which they are all pointing.

Architects are pointing to it in their specifications because they like its modern, wafer-thin appearance and the way it "blends" with the ceiling.

Engineers are pointing to it because of its efficient, high quality illumination with excellent diffusion and low brightness control.

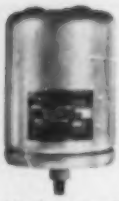
Electrical contractors point to its rugged features for speedy installation. And the ***building owner***, rightfully demanding full value on his investment, points with pride to QPCX7400 because he knows he's getting a lighting system engineered for long life and minimum maintenance. He's satisfied too, that the price is right and that future alterations can be accomplished economically.

Patents Pending

Write for bulletin A841.

SUNBEAM LIGHTING COMPANY | 777 E. 14th Pl., Los Angeles, Calif.
3840 Georgia Street, Gary, Indiana

Here's the inside story of Sola's new weatherproof mercury lamp transformers



Now Sola brings you its complete line of rugged, trouble-free mercury lamp transformers in lightweight, weather-resistant *aluminum* cases.

This new construction feature eliminates the problem of moisture penetration to the core-and-coil. These deep drawn cases are hermetically sealed against weather by mechanical pressure and a new kind of sealant that resists attack by water, sunlight, oxidation, corrosive fumes, oils, solvents and salt spray. The sealant bonds tightly to the aluminum case and withstands vibration, mechanical shock and temperature cycling.

Marked and color coded neoprene jacketed leads are brought out through neoprene bushings to further insure weatherproof, watertight transformers.

Aluminum construction means savings in shipping costs, easier installation and lower wind load in pole-top mountings. User upkeep and contractor callbacks are reduced because these rugged aluminum cases resist corrosion.

Sola Constant Wattage Mercury Lamp Transformers feature low starting current surge, regulation of lamp wattage and output despite line voltage fluctuations as great as ±13%, elimination of primary taps as well as reduced lamp outages due to line voltage drops, and greatly extended lamp life. Most units have a minimum starting temperature of -30°F.

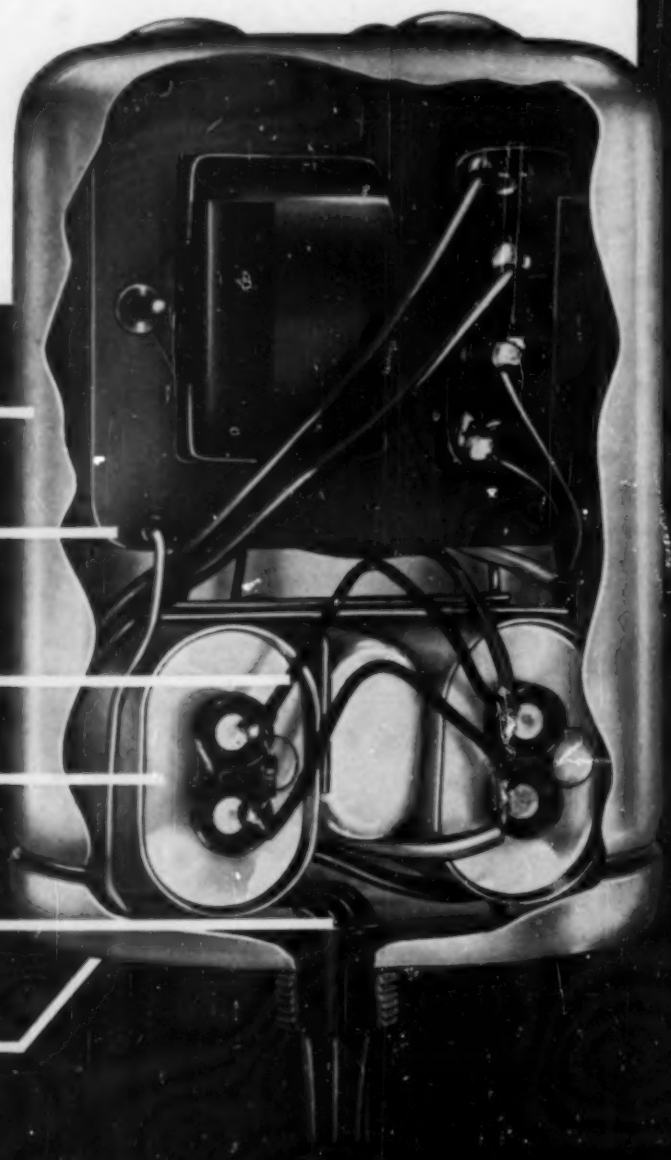
For more information, see your nearest Sola representative, or write for Bulletin MV.

SOLA

SOLA ELECTRIC CO.

A Division of
Basic Products Corporation

Busse Road at Lunt, Elk Grove, Illinois


Weather-resistant, one-piece deep-drawn aluminum case.
Rigidly supported impregnated core and coil.
New constant-wattage circuit plus class B insulation result in greatly improved performance.
Long lasting, heavy duty capacitors.
Marked, color-coded neoprene jacketed leads and neoprene bushing provide weather-tight fit.
Special sealant insures weatherproof protection of all components.

COMMITTEE PERSONNEL

COMMITTEES 1960-1961

All committees are appointed by the President, subject to approval of the Council. Except as provided in the Constitution, appointments terminate at the time of the first Council meeting of the following administration. The scope of each committee is indicated.

R. G. Slauer, President, ex-officio member of all Standing, General and Task Committees except Board of Fellows, Board of Nomination and Medal Award Committee.

J. R. Chambers, Vice-President, ex-officio member of all Technical Committees (by appointment).

STANDING COMMITTEES

COUNCIL EXECUTIVE—To conduct the affairs of the Society between Council meetings.

R. G. Slauer, Chairman, Sylvania Electric Products Inc., One 48th St., Wheeling, W. Va.

J. R. Chambers — W. P. Lowell, Jr.
G. F. Dean — J. D. Mitchell

BOARD OF FELLOWS—To evaluate the eligibility of candidates for transfer to the grade of Fellow, according to procedures approved by Council.

Bruce J. Jensen, Chairman, Public Service Electric & Gas Co., 80 Park Pl., Newark, N. J.

L. E. Barbrow — W. E. Folsom
J. W. Bateman — C. H. Rex
George P. Wakefield

FINANCE—To have direct supervision of the financial affairs of the Society and to present to the Council an annual report on its financial condition. To make recommendations to the Council as to the investment of monies and upon all specific appropriations. To prepare and submit for approval of Council not later than the first new Council meeting a budget of income and expense for the ensuing fiscal year.

A. C. Barr, Chairman, General Electric Co., Nela Park, Cleveland 12, Ohio.

H. S. Beagle — C. C. Shotwell
Max D. Orr — R. M. Zabel
W. P. Lowell, Jr., Treasurer, ex-officio

GENERAL BOARD OF EXAMINERS—To investigate the qualifications of all applicants for admission to membership; to elect or reject applicants for the grade of Associate Member and Student Member, to report such action to the Council; and to make recommendations to the Council regarding applications for transfer or election to the grade of Member or Retired Member, and for transfer to the grade of Member Emeritus.

Taylor Barr, Chairman, Central Hudson Gas & Electric Corp., 47 Cannon St., Poughkeepsie, N. Y.

Svend W. Bruun — Clarence W. Clarkson

PAPERS—To procure, review and approve all technical papers and discussions thereof, for presentation before National Conference of the Society.

B. S. Benson, Jr., Chairman, Benjamin Division, Thomas Industries, Inc., Des Plaines, Ill.

F. C. Breckenridge — J. S. Hamel
James Cox — Leon T. Johnson
C. M. Cutler — Roy A. Palmer
H. F. Davidson — T. C. Sargent
Kurt Franck — Floyd W. Sell
O. B. Goldsmith — G. A. Trosper
J. William Griffith — George Wakefield

PUBLICATIONS—To be responsible for the procurement, review and approval of all material for the publications of the Society other than technical papers approved by the Papers Committee for presentation at National Conferences of the Society and their discussions and committee reports, for which it will have publication responsibility only. Shall also be responsible for the editing, printing and business management of the publications of the Society; specific exceptions may be made by Council.

R. W. Morris, Chairman, General Electric Co., Nela Park, Cleveland 12, Ohio.

C. L. Amick — Brooks Chassaing
B. S. Benson, Jr. — George W. Clark
Arthur R. Jaeger

GENERAL COMMITTEES

ADVANCE PLANNING—To study the long range objectives of the Society—its operation, program, publication activities, membership classifications and financial structure, and to make recommendations to Council.

C. W. McCormick, Chairman, Connecticut Light & Power Co., P. O. Box 2010, Hartford, Conn.

J. M. Chorlton — B. Travis
J. J. Neidhart — L. C. Twichell
J. D. Whitnell

ALLIED ARTS—To encourage and assist local competitions in allied arts, in cooperation with technical committees and interested local groups.

R. W. Brown, Chairman, Cincinnati Gas & Electric Co., Cincinnati, Ohio.

Carl Albach — Edward Rambusch
Roy Dahlin — Wilbur D. Riddle
W. A. Hedrich — Joel E. Rubin
L. T. Kight — John A. Russell
William M. C. Lam — J. D. Whitnell

APPLIED LIGHTING COMPETITION—To encourage and assist local and regional competitions and to conduct the national competition during the National Technical Conference, in accordance with procedure approved by the Council.

J. C. Wilson, Chairman, J. A. Wilson Lighting & Display Ltd., 280 Lakeshore Rd., Toronto, Ont.

Raymond L. Smart, Vice-Chairman, Boston Edison Co., 39 Boylston St., Boston 12, Mass.

G. F. Dean — Harry Nellis
Joseph Thomas

BOARD OF NOMINATION—To prepare a nomination ticket containing the names of those who are deemed best suited to serve as officers and directors in positions to be filled at the ensuing election.

K. M. Reid, Chairman, General Electric Co., Nela Park, Cleveland 12, Ohio.

J. B. Browder — G. J. Taylor
and regional representatives

CONSTITUTION AND PROCEDURES — To prepare proposed amendments to the Constitution and By-laws, to prepare statements of policies and procedures consistent with the Constitution and By-laws, and to report to Council.

L. C. Twichell, Chairman, Rochester Gas & Electric Corp., 89 East Ave., Rochester, N. Y.

G. F. Dean — Raymond L. Smart
R. F. Hartenstein — Walter Sturrock
C. C. Keller — Joseph Thomas

MEDAL AWARD—To evaluate the eligibility of candidates for award of the IES Medal according to procedures approved by the Council.

A. F. Wakefield, Chairman, The Wakefield Company, Vermilion, Ohio

J. W. Barker — Edward Rambusch
J. B. Browder — K. M. Reid
Wilton B. Hastings — G. E. Shoemaker
W. P. Little — G. J. Taylor

MEMBERSHIP—To develop plans and supervise the operation of the individual membership activity of the Society.

George W. Clark, Chairman, Sylvania Electric Products Inc., One 48th St., Wheeling, W. Va.

NATIONAL TECHNICAL CONFERENCE — To be completely responsible, subject to the approval of Council, for the general coordination of all conference activities, for selecting and recommending time and place, for review of the plans and budgets of the National Technical Conference Executive Committee, and in cooperation with the Papers Committee for the satisfactory time allocation for the technical papers sessions, according to Procedures and Policies as adopted by Council.

C. L. Amick, Chairman, Day-Brite Lighting, Inc., P. O. Box 141, St. Louis, Mo.
Frank Yanaros

A. C. Barr — E. T. Dorsey
B. S. Benson, Jr. — L. F. Heckmann
Brooks Chassaing — P. M. Rutherford
Henry G. Clum — Julian S. Smith
Richard Cohen — L. E. Tayler
John B. Deck, Jr. — Frank Yanaros

1961 Conference Executive Committee

Brooks Chassaing, Chairman, Chassaing Bros. Lighting, 7601 Forsyth Blvd., Clayton 5, Mo.

PUBLIC RELATIONS AND INFORMATION—To prepare and disseminate information about the activities, accomplishments, programs, objectives and policies of the Society and about the place of illuminating engineering in modern society; to formulate and submit public relations policies and plans to the Society.

Gordon Wells, Chairman, Day-Brite Lighting, Inc., 5411 Bulwer Ave., St. Louis 7, Mo.

J. R. Bailey — Vernon T. Kempf
Richard E. Hars — R. W. Sclater

REGIONAL ACTIVITIES—To represent the respective Regions before the Council and to keep the Council informed regarding the affairs of the Regions. To stimulate Society activities, to encourage joint meetings of Sections and Chapters including Regional Conferences within the respective Regions, and to promote the expansion of the Society.

G. F. Dean, Chairman, Toronto Hydro-Electric System, 14 Carlton St., Toronto, Ont.

Cecil L. Cannon — C. D. Miller
J. M. Chorlton — L. S. Reed
R. D. Cohen — Alston Rodgers
J. T. Cottingham — Richard M. Smart
J. B. Deck, Jr. — J. S. Williams
R. H. Kreyser — R. L. Zahour

RESIDENCE LIGHTING FORUMS—To stimulate and assist the Residence Lighting Forums of the Society and to encourage the formation of additional forums. To conduct a Residence Lighting Forum in connection with the National Technical Conference.

(*Continued on page* 30A)

(*Continued from page 29A*)

Aileen Page, Chairman, General Electric Co., Nela Park, Cleveland 12, Ohio.

Dorothy Davis — Lloyd Gabler
Frank Feagans — Jack Sahlman
Virginia Skinner

SUSTAINING MEMBERSHIP — To develop plans and supervise the operation of the Sustaining Membership activity in the Society according to the Procedures and Policies adopted by Council.

G. J. Taylor, Chairman, Day-Brite Lighting, Inc., 212 South Central Ave., Clayton 5, Mo.

B. F. Benning, Vice-Chairman, Graybar Electric Co., Inc., 420 Lexington Ave., New York, N. Y.

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E. H. Church — R. L. Sawyier, Jr.
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E. C. Huerkamp — L. E. Tayler

Fund Subcommittee

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E. H. Church — W. E. Henges
F. F. Fleischman, Jr. — J. J. McLaughlin
E. O. George — J. C. Wilson

TRUSTEES, IES HEADQUARTERS RETIREMENT PENSION PLAN

G. J. Taylor, Chairman, Day-Brite Lighting, Inc., 212 South Central Ave., Clayton 5, Mo.

A. C. Barr — J. B. Browder
W. P. Lowell, Jr.

TASK COMMITTEES

STUDY OF LIGHTING SERVICE COMMITTEE—To study and report upon a broader program through which to achieve the committee's objectives to stimulate and promote the discussion and practical applications of lighting recommendations.

W. P. Graham, Chairman, Philadelphia Electric Co., 211 S. Broad St., Philadelphia 5, Pa.

G. J. Gillen — G. J. Kennedy
B. J. Jensen — M. N. Waterman

IES TERRITORIAL AND ORGANIZATIONAL—To study regional boundaries with respect to the preparation of a plan to encompass the future growth pattern of the Society.

J. B. Chambers, Chairman, Appleton Electric Co., 1701-59 Wellington Ave., Chicago 13, Ill.

Brooks Chassaing — C. D. Miller
J. M. Chorlton — J. D. Mitchell
G. F. Dean — M. N. Waterman

FOR FEASIBILITY OF DESIGN CERTIFICATION—To make a study of the feasibility of the IES entering into a program of design certification of all types of luminaires.

J. B. Browder, Chairman, Georgia Power Co., 75 Marietta St., N.W., Atlanta 1, Georgia.

H. S. Beagle — W. C. Brown
R. B. Brown, Jr. — Ward Harrison

ON EDUCATIONAL AND PROFESSIONAL STANDARDS—To study the trend in educational and professional standards for illuminating engineering (including methods for achieving these), consulting with related committees (Education, Membership, Advance Planning), and to prepare recommendations for report to Council.

C. L. Amick, Chairman, Day Brite Lighting Inc., P.O. Box 141, St. Louis 66, Mo.

TECHNICAL COMMITTEES

AVIATION—To study the application of light and lighting to the spaces and functions involved in the operation of aircraft.

C. A. Douglas, Chairman, National Bureau of Standards, Washington 25, D. C.

C. E. Leberknight, Vice-Chairman, Kopp Glass, Inc., Swissvale, Pittsburgh 18, Pa.

John P. Hoxie, Recording Secretary (Program Coordinator), Product Engineering Dept., Corning Glass Works, Corning, N. Y.

Victor Converso, Corresponding Secretary, Aviation Planning Division, Port of N. Y. Authority, 111 8th Ave., New York, N. Y.

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J. F. Angier — L. W. Hornfeck
F. C. Ashe — W. D. Howell
J. A. Bartelt — W. A. Jensen
J. B. Bartow — Carl Johnson
E. Boghosian — E. B. Karns
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P. Burian — *T. M. Lemons
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*B. Hemelt — A. B. Winters
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F. E. Carlson — John P. Hoxie
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Taxiway Lighting

Lawrence W. Hornfeck, Chairman, 711 Penn Ave. Bldg., Pittsburgh, Pa.

Louis Achitoff — H. G. Gatlin
C. N. Cook — B. Hemelt
James Furr — C. B. Phillips
J. W. Semeroth

COLOR—To study, evaluate and report on the effect of color in relation to the art and science of illumination.

R. C. Allison, Chairman, The T. Eaton Co., Ltd., 190 Yonge St., Toronto 1, Ont.

W. E. Carswell — G. F. Dean

DAYLIGHTING—To study the problems involved in daylighting, develop recommended practices and report thereon.

J. W. Griffith, Chairman, Southern Methodist University, Industrial Engineering Dept., Dallas, Texas.

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R. A. Boyd — E. M. Linforth
A. A. Brainerd — R. W. McKinley
H. S. Bull — F. W. Mowrey
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C. D. Gibson — P. W. Seagers
B. F. Greene — D. E. Spencer
J. J. Kemendo — K. C. Welch
R. C. Kendall — O. F. Wenzler
M. W. Keyes — C. J. Youngblood

EDUCATION—To study and encourage lighting education and training for professional careers in schools, colleges and elsewhere; to prepare educational and training material on fundamental and advanced concepts of light and illumination, and to further its adoption in courses conducted by Sections and Chapters.

Alston Rodgers, Chairman, General Electric Co., Nela Park, Cleveland 12, Ohio.

O. P. Cleaver — Roy A. Palmer
E. L. Fairchild — R. C. Putnam
D. M. Finch — T. H. Shepherd
W. A. Hedrich — W. Sturrock
P. H. Hildebrand — R. S. Wiseman
H. W. Horn — I. A. Yost

Brochure on "Opportunities in Illuminating Engineering"

J. L. Tugman, Chairman, General Electric Co., Nela Park, Cleveland, Ohio.

R. C. Putnam — R. S. Wiseman

Revision of IES Courses

C. W. Zersen, Coordinator, Chicago Lighting Institute, 140 S. Dearborn St., Chicago, Ill.

Revision of "Lighting Fundamentals Course"

R. E. Wozniak, Chairman, Chicago Lighting Institute, 140 S. Dearborn St., Chicago, Ill.

Robert Allen — B. F. Avery
A. M. Bacalar

Revision of "Advanced Lighting Design Problems Course"

R. R. Lusk, Chairman, Commonwealth Edison Co., 7601 S. Lawndale Ave., Chicago 29, Ill.

Gerald Marks — J. F. Parsons
William Weibel

Science Textbook Review—To work with the Better Light Better Sight Bureau in providing an authoritative review service to assist authors and editors preparing new textbooks or revising existing ones, to insure that text and illustrations on light and lighting are technically correct and up to date. The BLBS Bureau will contact the publishers of science textbooks for use in elementary and secondary schools, obtain the material to be reviewed and act as liaison with this subcommittee, who will do the actual work of review and comment.

J. L. Tugman, Chairman, General Electric Co., Nela Park, Cleveland 12, Ohio.

E. L. Fairchild — P. H. Hildebrand
W. A. Hedrich — J. F. Parsons

HANDBOOK—To have continuous responsibility for appraising the service rendered by the Handbook, for its accuracy and improvement; to advise Council when revisions and new editions are needed. To revise and arrange the technical content of the Handbook; to lay out, plan, and arrange for development of individual sections primarily through appropriate technical committees, to consult with the Publications Committee on its presentation of a suitable publication budget for Council approval; to be responsible to Council for the format, accuracy, and treatment of material. M. N. Waterman, Chairman, Westinghouse Electric Corp., Bloomfield, N. J.

B. J. Jensen — J. J. Neidhart

INDUSTRIAL—To initiate, follow up and coordinate lighting study projects in the industrial field, review the reports of the various subcommittees in this field and make recommendations to Council.

L. G. Parks, Chairman, Ebasco Services, Inc., 2 Rector St., New York, N. Y.

Theodore Ake — N. T. Kridel
A. A. Brainerd — E. A. Linsday
M. M. Buzan — Howard Long
H. A. Cook — B. J. Monaghan
W. B. Kahler — D. J. O'Neill
D. W. Rowten

Graphic Arts

James Rodisch, Chairman, Philadelphia Electric Co., 211 S. Broad St., Philadelphia, Pa.

Outdoor Production Areas

H. A. Cook, Chairman, Detroit Edison Co., 2000 Second Ave., Detroit 26, Mich.

D. R. Brown — D. J. O'Neill
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(*Continued on page 32A*)

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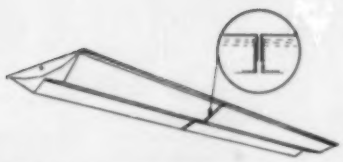

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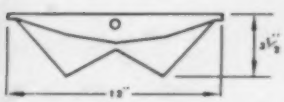

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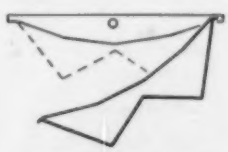

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M. B. Bunsen	W. Lilac
W. C. Cummings, *Jr.*	E. A. Linsday
W. H. Kahler	W. S. Till

H. W. Wenson

Rubber Industry

Keith Nesbitt, Chairman, Sacks Electrical Supply Co., Akron, Ohio.

INSTITUTIONS—To initiate, follow up and coordinate lighting study projects in the field of public buildings and private institutions, review the reports of the various study subcommittees in this field and make recommendations to Council.

R. D. Bradley, Chairman, Day-Brite Lighting, Inc., 5411 Bulwer Ave., St. Louis, Mo.

B. F. Avery	C. N. Laupp
L. V. James	J. H. McCulloch

H. M. Sharp

Churches

George Shoemaker, Chairman, Philadelphia Electric Co., 211 S. Broad St., Philadelphia 5, Pa.

John Adams	T. N. Mansell
A. L. Bloecker	H. W. Olsen

A. C. Sangster

Hospitals

N. L. Griffin, Chairman, Department of Health, Education and Welfare, Public Health Service, Division of Hospital and Medical Facilities, Washington, D. C.

L. J. Buttolph	H. L. Logan
Rose M. Coakley	R. C. Putnam
Howard Haynes	P. W. Seagers

H. M. Sharp

JOINT FARM (IES-American Society of Agricultural Engineers)—To study the application of light and lighting of farm buildings, surrounding work areas and other rural locations and to report thereon.

Morris Lloyd, Chairman, Niagara Mohawk Power Corp., 535 Washington St., Buffalo 3, N. Y.

J. P. Ditchman	M. O. Whithed
J. P. Schaenzer	D. E. Wiant

JOINT LIGHTING SURVEY—(IES-U.S. Public Health Service)—To outline a method of making a survey of the visual factors of the working environment and the worker's vision and evaluating the findings in terms of visual comfort and effectiveness and eye health.

J. F. Parsons, Chairman, Niagara Mohawk Power Corp., 535 Washington St., Buffalo 3, N. Y.

H. N. Doyle, Vice-Chairman, U. S. Public Health Service, Washington 25, D. C.

Tula Brocard	L. E. Duval, *Jr.*
L. J. Cahill	A. L. Koven
George Clayton	R. P. Teele

LIGHT CONTROL AND EQUIPMENT DESIGN—Collect and correlate the knowledge and data on means and methods of controlling, directing, reflecting, transmitting and diffusing light and on the principles and practices of equipment design.

J. N. Robertson, Chairman, Los Angeles Dept. of Water and Power, Design and Construction Division, 405 S. Hill St., Los Angeles, Calif.

Milton Buzan, Vice-Chairman, Day-Brite Lighting, Inc., 5411 Bulwer Ave., St. Louis, Mo.

R. S. Hawes, Secretary, K-S-H Plastics, Inc., High Ridge, Mo.

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Prescott Coan	F. M. Neal
W. S. Blitzer	M. E. Robertson
E. H. Church	W. A. Weibel

F. C. Winkler

IES-SPI-NEMA

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J. S. Cape	Paul O'Connell
A. R. Chick	E. S. Naidus
Prescott Coan	E. R. Smith
W. J. Fitzgerald	Elmer Stantay
George Gilleard	R. D. Ullrich
R. S. Hawes, III	J. H. Versteeg
R. F. Hibbert	George Wakefield

H. A. Williams

LIGHT SOURCES—To correlate and report available information as to the physics of light and light production and the characteristics of current light sources.

Herbert A. Anderson, Chairman, Duro-Test Corp., North Bergen, N. J.

L. E. Barbrow	George Freeman
W. E. Carpenter	D. S. Gustin
R. D. Churchill	Walter Houston
David Cutler	E. F. Kelly
G. E. Davidson	O. Leinhard
R. B. Dull	M. E. Robertson

E. H. Salter

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Dorothy Nickerson, Chairman, 2029 New Hampshire Ave., N.W., Washington 9, D. C.

C. N. Clark	Norman Macbeth
George Freeman	G. B. Stillwell
C. W. Jerome	Luke Thorington
D. B. Judd	A. W. Weeks

Gunter Wyszecki

MAINTENANCE—To study the elements contributing to maintenance factors; set up the framework of typical field studies to determine factors; and to stimulate the prosecution of such studies by appropriate agencies.

Leo Duval, Chairman, Sylvania Electric Products Inc., 60 Boston St., Salem, Mass.

MERCHANDISING (formerly Store Committee)—To study the application of light and lighting to the spaces and processes involved in the selling of goods and to report thereon.

W. H. Kahler, Chairman, Westinghouse Electric Corp., 1216 W. 58th St., Cleveland 1, Ohio.

Theodore Ake	Lester Geis
R. C. Allison	Herbert Hoffman
C. W. Clarkson	Richard Kelly
L. H. Dickelman	L. N. Lamboy
R. T. Dorsey	N. J. Sonnenfeld
Norman Falk	K. C. Welch

Service Stations and Parking Areas

E. H. Schaefer, Chairman, Wisconsin Electric Power Co., 231 W. Michigan St., Milwaukee 3, Wisconsin

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W. G. Barr	M. C. Harsh
D. B. Brown	A. L. Hart
H. A. Elwell	Frank Lago
Ralph Enghouser	John Mucha

W. W. Weld

MOTOR VEHICLE (EXTERIOR)—To study the problems of illuminating the night operations of motor vehicles and to make suitable recommendations for promoting maximum safety and convenience including accessory illuminated signal and traffic aids.

R. P. Teele, Chairman, National Bureau of Standards, Washington 25, D. C.

Earl Allgaier	H. C. Mead
L. L. Beltz	F. G. Majar
H. S. Bull	R. I. Nagel
W. E. Carpenter	Karl Neulinger
L. W. Chubb, *Jr.*	S. C. Peck
D. M. Finch	E. R. Ricker
T. R. Kilgour	V. J. Roper
Charles Marsh	Roger Sachett

NOMENCLATURE—To define the terms and standards of illumination, and endeavor to obtain uniformity in nomenclature.

S. K. Guth, Chairman, General Electric Co., Nela Park, Cleveland 12, Ohio.

Abraham Abramowitz	J. O. Kraehenbuehl
E. Q. Adams	W. F. Little
L. E. Barbrow	Philip O'Brien
C. L. Cottrell	Priscilla Presbrey
D. M. Finch	Harris Reinhardt

OFFICE—To study the lighting requirements of office lighting tasks, develop suitable lighting recommendations and report thereon.

G. G. Rae, Chairman, Holophane Co., Inc., 342 Madison Ave., New York 17, N. Y.

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C. L. Amick	J. J. McLaughlin
E. H. Church	C. W. McClelland
C. W. Clarkson	J. J. Neidhart
G. F. Dean	J. E. Sweatte
R. N. Edwards	R. T. Waite
W. S. Fisher	G. P. Wakefield
J. L. Kilpatrick	H. A. Williams
C. W. Macy	R. R. Wylie

R. L. Zahour

PROGRESS—To keep in touch with developments in the art of lighting throughout the world and prepare a yearly review of achievements in the art of illuminating engineering for inclusion in ILLUMINATING ENGINEERING.

M. K. Strang, Chairman, Curtis-AllBrite Lighting, Ltd., 195 Wicksteed Ave., Leaside, Toronto 17, Ont., Canada.

H. A. Williams, Vice-Chairman, Rohm & Haas Co., Washington Square, Philadelphia, Pa.

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H. A. Anderson	W. S. Kolb
Nelson Bleisch	E. C. Pauly
R. T. Dorsey	T. C. Sargent
Norman Falk	S. M. Segal
R. E. Faucett	R. P. Teele
John Gornet	R. R. Tipton
R. E. Harz	R. F. Townsend
A. R. Jaeger	Russell Viehman

QUALITY AND QUANTITY OF ILLUMINATION, RECOMMENDATIONS FOR—To prepare recommendations of illumination levels, brightness limits and brightness relationships in form applicable to practices.

J. J. Neidhart, Chairman, The Miller Co., Meriden, Conn.

W. H. Kahler, Vice-Chairman, Westinghouse Electric Corp., 1216 W. 58th St., Cleveland, Ohio.

Willard Allphin	W. H. Kahler
R. D. Bradley	L. G. Parks
J. M. Chorlton	G. G. Rae
J. W. Griffith	E. M. Strong
S. K. Guth	R. P. Teele

RESIDENCE—To study and report on the application of light and lighting in residences; to develop performance recommendations for residence luminaires and to prepare necessary educational aids.

S. R. Shemitz, Chairman, C. S. Mersick Electric Supply Corp., 135 Orange Ave., West Haven, Conn.

William Blitzer	Elizabeth A. Meehan
Myrtle Fahsbender	Jan Reynolds
Helen Gibbons	Vito Russo
Benjamin Goodman	Mary B. Taepke
W. F. Little	H. A. Van Collie
F. J. Marriett	Mary E. Webber

N. E. Wernert

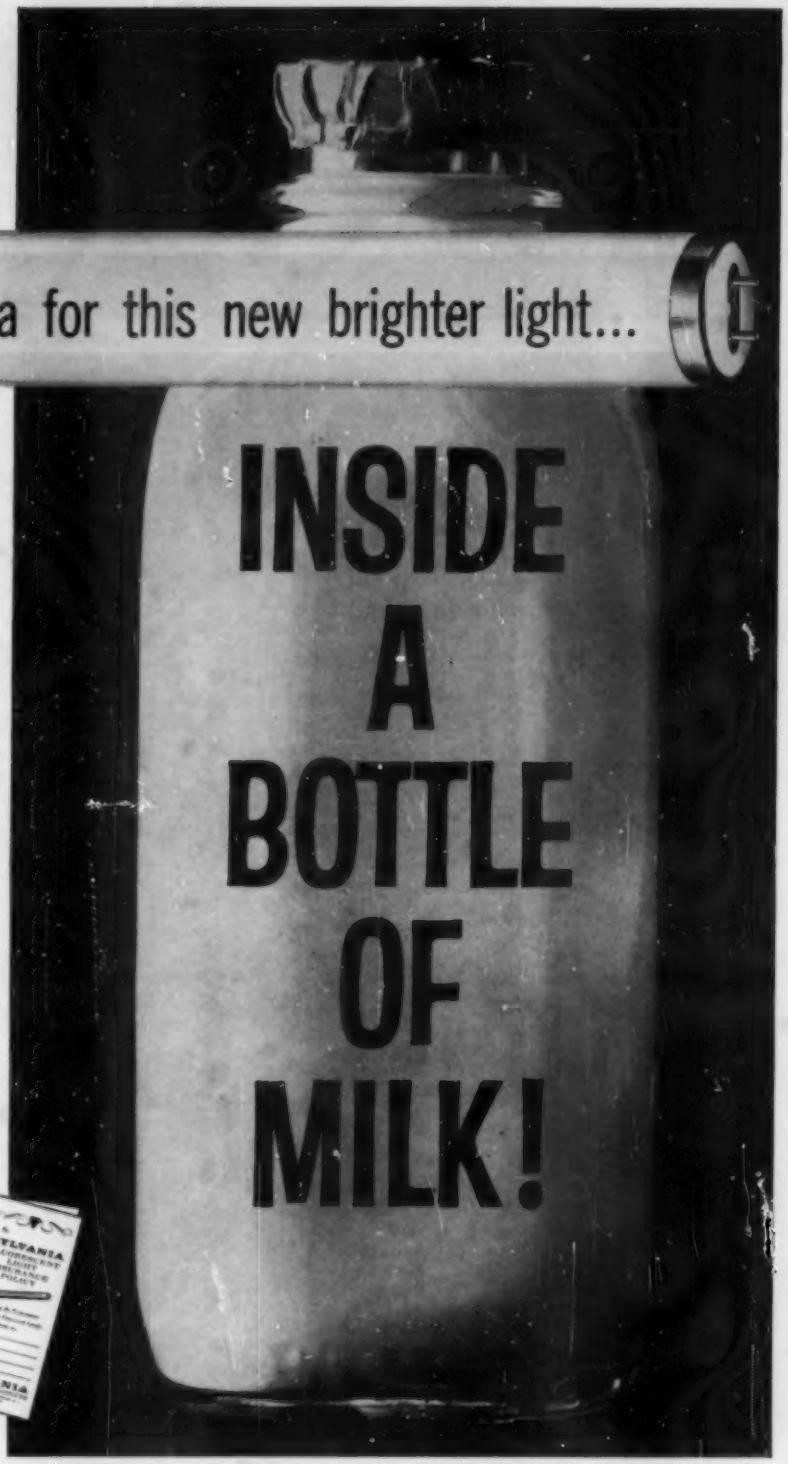
ROADWAY—To establish the scientific principles underlying street and highway lighting; to collect data on the results of the application of such principles to actual practice; to prepare such reports thereon as will assist technicians and benefit the public.

Thomas J. Seburn, Chairman, Bureau of Highway Traffic, Strathcona Hall, Yale University, New Haven, Conn.

L. F. Heckmann, Vice-Chairman, Union Metal Mfg. Co., 143 Maple Ave., N.E., Canton, Ohio.

H. E. Mason, Secretary, City Hall Annex, Room 1032, Philadelphia, Pa.

(*Continued on page 34A*)



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SYLVANIA

Subsidiary of GENERAL TELEPHONE & ELECTRONICS

(*Continued from page 32A*)

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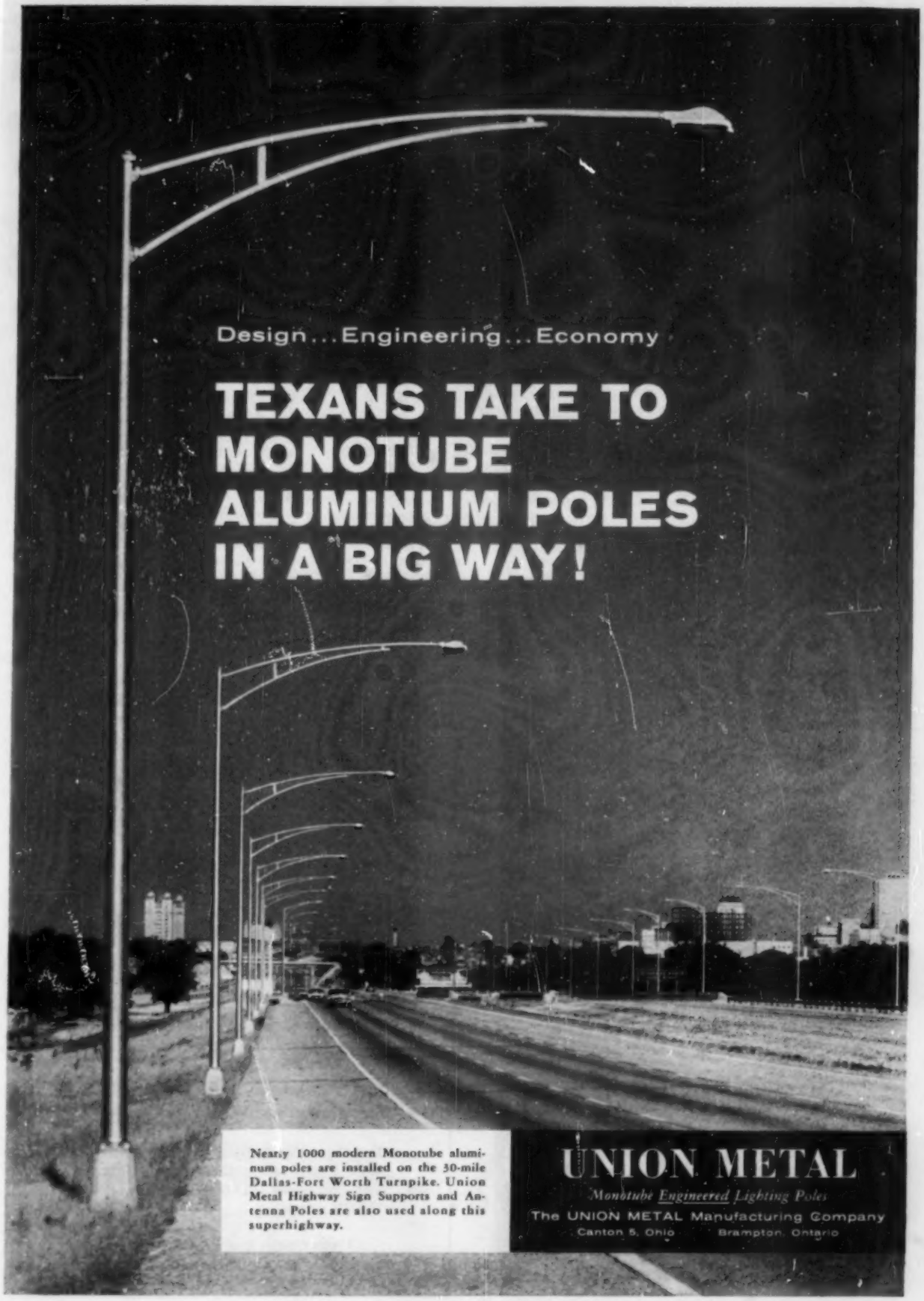
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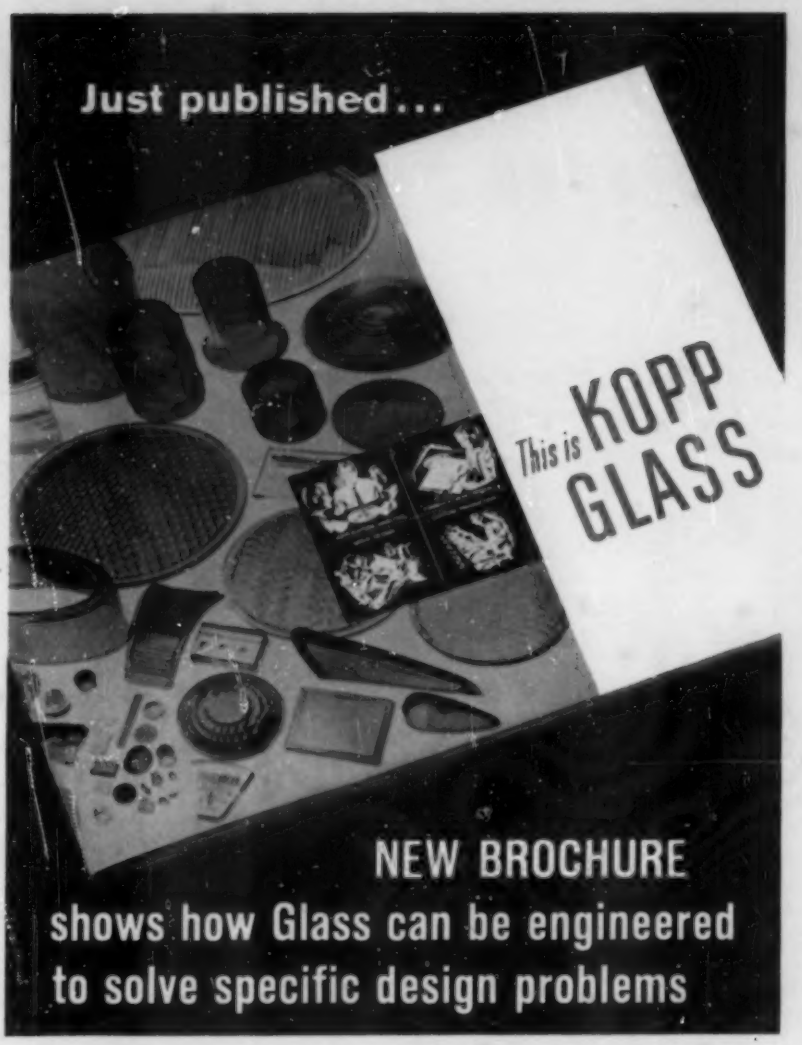

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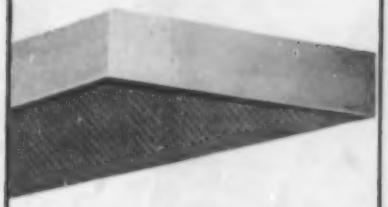

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The new, modern design of the VEGA plus the excellent qualities of the semi-gloss baked-on enamel finish with a reflectance factor of approx. 86% produce lighting efficiency of the highest caliber.

eCONOMY

Crisp, trim lines plus deluxe, quality features and true versatility make the VEGA's value unequalled in its moderately-priced class of surface mounted fluorescent fixtures.

eYE-APPEAL

Shallow 3½" depth. Choice of four diffusers: "Starlite Prismatic" or formed polystyrene, plastic eggcrate or Albalite Pattern #93. Available in 12, 18, 24 and 48" widths.

WRITE TODAY FOR FULL DETAILS AND CATALOG SHEET

Sold Only Through Qualified Electrical Distributors

METALCRAFT PRODUCTS CO., INC.
6225 State Rd., Phila. 35, Pa.

EMPLOYMENT OPPORTUNITIES

POSITION WANTED

Free Lance. Design Draftsman over 12 years' experience lighting fixture design and layout, shop drawings. Address Box 472, Publications Office, Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y.

POSITION WANTED

Lighting Designer, 13 years' experience, field application, also sales contact with architects and engineers. Address Box 471, Publications Office, Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y.

MARKETING MANAGER

Eight years' electrical-building products experience . . . advertising, sales promotion, merchandising, market research, public relations, and sales management. Have created top readership advertising, award-winning product literature; increased brand recognition and strengthened corporate image. Top references leading companies. Age 34, married, two children. Resume on request. Address Box 470, Publications Office, Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y.

POSITION WANTED

Purchasing Manager in Midwest wants to relocate with small to medium-size organization in West-Pennsylvania—East-Ohio area. Formerly purchased in Pittsburgh area. Top performance record, qualifications and references in Material Management, Purchasing, Inventory Control, Estimating, Value Analysis, Traffic. College, Accounting Major. Age, 42. Fourteen years supervisory capacity in both light and heavy industry. All material and capital equipment. Four years in lighting field. Address Box 469, Publications Office, Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y.

SPECIFICATION LIGHTING LINES WANTED—NEW ENGLAND AREA

Newly established manufacturers' representative currently covering New England for a non lighting product seeks quality lighting line. Twelve years' previous experience in distributor development and contact with contractors, utilities, architects and engineers in N.E. area for the Lamp Division, General Electric Co. Replies held in strict confidence. Address Box 468, Publications Office, Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y.

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Excellent earning situation open to right man in the state of Oklahoma to represent a nationally established, highest quality and most complete line of lighting fixtures. This territory formerly handled out of Dallas, Texas. Thorough experience with commercial, institutional and industrial lighting applications required especially at the specification level. Send resume, which will be held in strict confidence, direct to . . .

SUNBEAM LIGHTING COMPANY
c/o V.P. Charge of Sales
777 East 14th Place
Los Angeles 21, California

(Continued from page 26A)

Siegel, Maurice, Haluk Lighting & Mfg. Co., San Francisco, Calif.

Associate Members:

Brown, C. M., Pacific Gas & Electric Co., San Francisco, Calif.
Henderson, R. G., Pacific Gas & Electric Co., San Francisco, Calif.
Kabler, R. W., Lighting Dynamics, San Francisco, Calif.
Maffei, R. T., Charles B. Farrow Inc., San Francisco, Calif.
Shinn, E. S., Edward S. Shinn & Associates, San Francisco, Calif.
Wakefield, K. V., Edward S. Shinn & Associates, San Francisco, Calif.

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No elections

SAN DIEGO SECTION

Member:

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SOUTHERN CALIFORNIA SECTION

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No elections

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Passman, Irving, Wide-Lite Corp., Houston, Texas.

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No elections

NON-REGION

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NON-SECTION

No elections

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provide — shadowless easy seeing illumination — improves efficiency — lessens fatigue for accurate speedy work...

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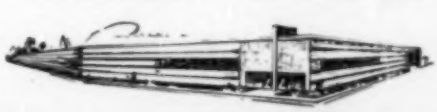

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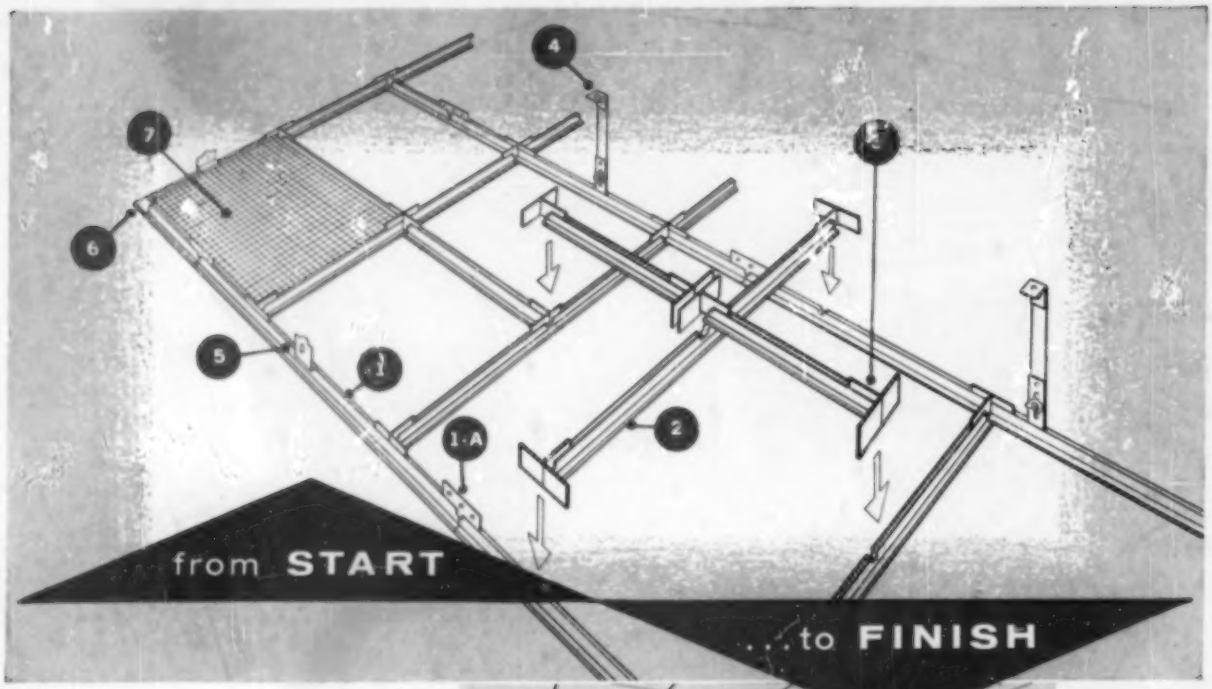

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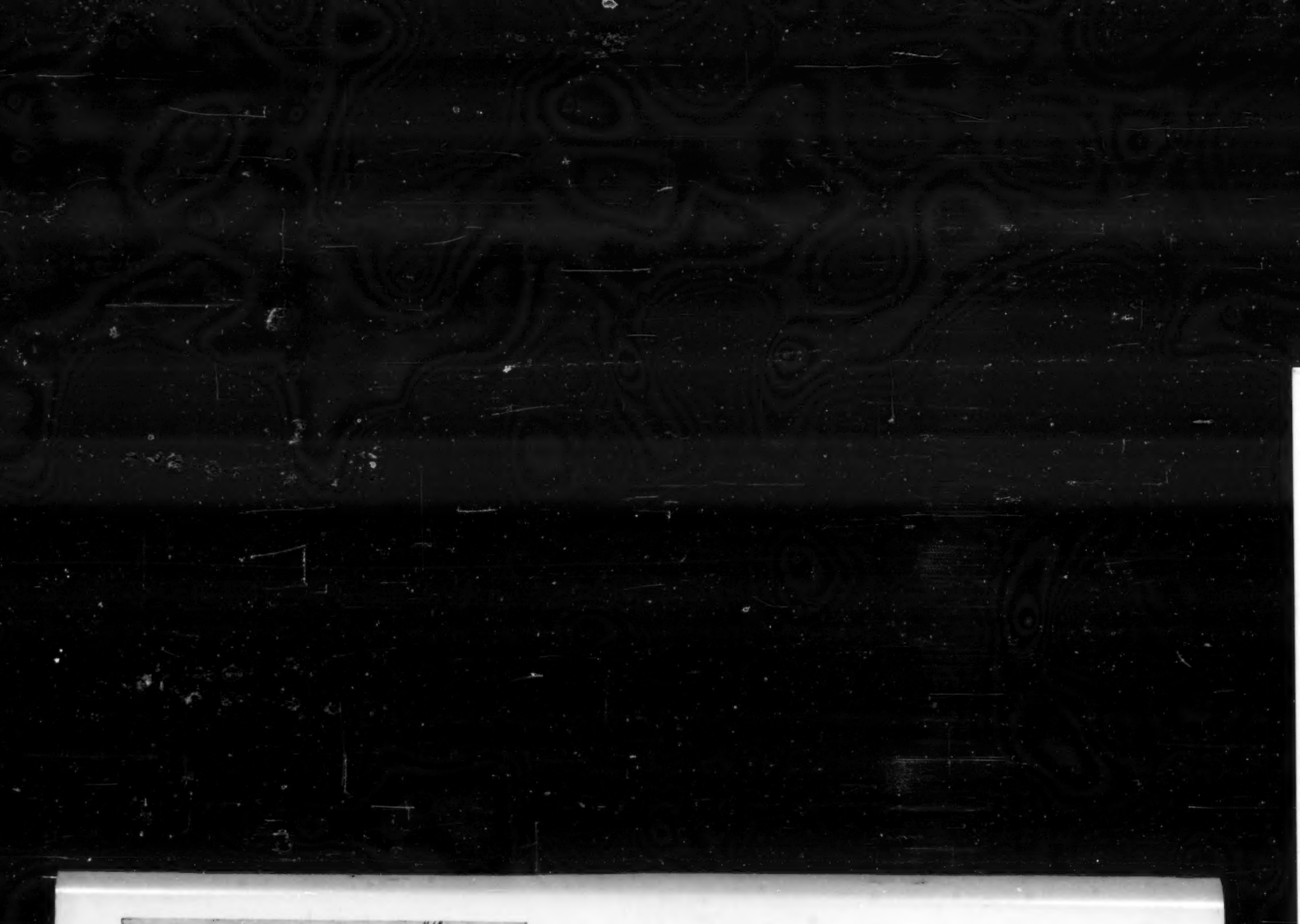
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